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The knowing ear:
An Australian test of universal claims about the semantic structure of sensory verbs and their extension into the domain of cognition

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The knowing ear: An Australian test of universal claims about the semantic structure of sensory verbs and their extension into the domain of cognition.

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Milyilyi-lu kulirninpa, langa kulirninpa-lu
brain-ERG hear/think, ear hear-at him/her
'Our brain thinks/hears, our ears think/hear' [Kukatja, from Peile 1997]

1 Introduction[1]

In this paper we test previous claims concerning the universality of patterns of polysemy and semantic change in perception verbs. Implicit in such claims are two elements: firstly, that the sharing of two related senses A and B by a given form is cross-linguistically widespread, and matched by a complementary lack of some rival polysemy, and secondly that the explanation for the ubiquity of a given pattern of polysemy is ultimately rooted in our shared human cognitive make-up. However, in comparison to the vigorous testing of claimed universals that has occurred in phonology, syntax and even basic lexical meaning, there has been little attempt to test proposed universals of semantic extension against a detailed areal study of non-European languages.

To address this problem we examine a broad range of Australian languages to evaluate two hypothesized universals: one by Viberg (1984), concerning patterns of semantic extension across sensory modalities within the domain of perception verbs (i.e. intra-field extensions), and the other by Sweetser (1990), concerning the mapping of perception to cognition (i.e. trans-field extensions). Testing against the Australian data allows one claimed universal to survive, but demolishes the other, even though both assign primacy to vision among the senses.

On the basis of a crosslinguistic typological study, Viberg (1984) reports a universal hierarchy of perception verbs, with vision at the top, and a unidirectional tendency of semantic change which works in accordance with the hierarchy. Our paper extends his study to Australian languages and confirms his findings.

Sweetser (1990), predominantly on the basis of Indo-European data, argues that "the objective, intellectual side of our mental life seems to be regularly linked with the sense of vision" (1990:37), whereas "hearing is connected with the specifically communicative aspects of understanding, rather than with intellection at large", and "it would be a novelty for a verb meaning to 'hear' to develop a usage meaning 'know' rather than 'understand',

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[1] Much of the collaborative work enabling this paper to be written was undertaken while Evans was a visiting fellow at MPI Nijmegen. Evans wishes to thank the University of Melbourne for study leave to work in Nijmegen, MPI Nijmegen for furnishing an ideal work environment for addressing these problems, the Alexander von Humboldt-Stiftung for supporting his writing up of related work on Mayali in 1997-8, and the Australian Research Council (Large Grant: Polysemy and Semantic Change in Australian Languages) for its financial support. Wilkins would like to thank the Max Planck Society for the funding of annual field trips in the period 1992-1997. Earlier versions of the paper were presented at the Institut für Sprachwissenschaft, U. Köln; the Department of Linguistics, University of New England, U.C. Berkeley, the Department of Linguistics & Applied Linguistics, U. Melbourne; we thank participants in those seminars for their useful comments. We are also grateful to Felix Ameka, Melissa Bowermann, Gavan Breen, Eve Danziger, Bob Dixon, Murray Garde, Cliff Goddard, Jean Harkins, John Haviland, Penny Johnson, Mary Laughren, Steve Levinson, Bill McGregor, Andrew Mirtschin, David Nash, Nick Reid, Eva Schultze-Berndt, Eve Sweetser and Anna Wierzbicka for useful discussions, comments and data. Most importantly we wish to thank the speakers who have taught us about various Australian languages mentioned here: the Arrernte speakers affiliated with the Yipirinya School and Intelyape-lyape Akaltye project in Alice Springs (esp. Margaret Heffernan); Netta Loogatha, Darwin Moodonuthi, and Paula Paul (Kayardild); Alice Bohm and Jack Chadum (Dalabon), David Karlbuma (Dalabon and Kune), Toby Gangele (Mayali), and Mick Kubarkku (Kuninjku).

whereas such a usage is common for verbs meaning 'see'" (1990:43). But as we shall demonstrate, Australian languages regularly recruit verbs of cognition like 'think' and 'know' from 'hear' rather than 'see', supporting a more plastic and relativist view of the relation between perception and cognition.

This leaves us with a seeming paradox that, in Australian languages, vision both is and isn't the privileged modality in the lexical field of sensory verbs. This paradox is resolved if one accepts that the trans-field figurative projection of sense verbs into the domain of cognition is far more open to cultural variation than intra-field extensions are.

The research discussed in this paper forms part of a wider study of polysemy and semantic change in Australian Aboriginal languages (Evans 1992, 1997, Wilkins 1996, 1997). The broader question we are addressing is the extent to which patterns of polysemy and semantic change are language-independent, or, in contrast, culture- and language-specific. The issue of whether the mapping of perception to cognition is universal or culture-specific is, therefore, one of several case studies which we have undertaken to address this larger issue. Australian languages are particularly interesting and important for the wider study for four main reasons:

> (a) their typological and cultural distance from the Indo-European languages which have informed most work to date on semantic change and polysemy (and more specifically on metaphor).
> (b) the large number of related languages spoken in what is basically a single culture area, allowing us to observe the recurring patterns needed for formulating implicational statements with a fine grain.
> (c) the extensive cultural continuity and persistence of a hunter-gatherer economy on the Australian continent, which means that current systems are likely to be much closer to those in reconstructable language phases than is the case for, say, Indo-European.
> (d) the existence of indigenous traditions of auxiliary semiotic systems (e.g. respect registers, special initiation registers, sign languages), usually employing superordinate or hyperpolysemous terms that illustrate wider semantic links .

Our guiding hypothesis in this broader comparative study is that some semantic fields will be prone to more cross-linguistically divergent patterns of polysemy and semantic change than others, making the typological study of polysemy a key method for studying the areas in which the human mind is most subject to moulding by culture. The case of perception lexemes and their semantic extension is of interest, because it seems, pretheoretically, to involve both neuro-physiological givens (e.g. the structure and experience of basic perception) and cultural variables (e.g. the cultural foundations of metaphor and metonymy, and the classification and evaluation of knowledge).

The paper is organized as follows. In §2, we briefly examine three approaches to the crosslinguistic investigation of semantic extensions involving perception verbs. In §3, we present our own background theoretical assumptions with respect to the study of polysemy and semantic change and we review the type of data and methods we have used. The linguistic attributes of perception verbs in Australian languages will be discussed in §4, as will our findings concerning cross-sensory polysemy and semantic change within that semantic field. We then move on to discuss the Australian patterns of extension from perception to cognition in §5. While most of our data is drawn from everyday language registers, in §6 we show how data from other semiotic systems used in Australian communities recapitulates the findings in the two previous sections. Finally, in §7, we examine a number of social and cultural factors which help to explain why the pattern of extension from perception to cognition in Australian languages is so divergent from that in Indo-European languages.

2 Three research traditions concerning perception verbs

A primary reason for pursuing research into perception verbs and their patterns of semantic extension is that incompatible claims have been advanced with respect to this domain by investigators within three research traditions. Curiously, these three traditions have remained insulated from one another, with a total absence of cross-citation.

The first research tradition involves the typological study of lexicalization patterns across perceptual modalities within the semantic field of sensory (perception) predicates. Viberg (1981, 1984) found a unidirectional path for semantic extensions across the senses, proceeding downwards from vision: 'see' can develop the secondary meaning 'hear' or 'smell', for example, but never the reverse. We will return to these claims in more detail below (in §4); for the moment we merely observe that Viberg's findings, like the studies of colour terms by Berlin and Kay (1969), could be formulated as virtually exceptionless implicational universals of semantic extension across a broad cross-linguistic sample.

In the second tradition, scholars like Sweetser (1990) who take a cognitive linguistic approach have made clearly universalizing proposals (though admitting their evidence is confined to Indo-European languages) about the primacy of vision as the sensory modality used for metaphors of knowledge and thought. We have already outlined Sweetser's position briefly in the introduction, but two more complete quotes from her influential study illustrate this position more fully:

> The objective, intellectual side of our mental life seems to be regularly linked with the sense of vision, although other senses .. occasionally take on intellectual meanings as well. There are major similarities in our general linguistic treatments of vision and intellection. (Sweetser 1990:37)

> ... it is probably the case, then, that hearing is universally connected with the internal as well as the external aspects of speech reception. Inasmuch as speech is the communication of information or of other matter for the intellect, hearing as well as sight is connected with intellectual processing..... But hearing is connected with the specifically communicative aspects of understanding, rather than with intellection at large. (Sweetser 1990:43)

By contrast, recent studies within the third tradition — 'the anthropology of the senses' — emphasize (i) the degree to which different cultures weight the relative importance of sensory modalities differently, (ii) the range of cultural variation in the conscious use of, and appeal to, sensory modalities, and (iii) the culture-specific patterns of sensory symbolics, including different patterns in the linking of specific-sensory modalities with specific cognitive states. A recent book in this tradition, edited by Howes (1991), approvingly cites Ong's (1967) seminal article:

> Cultures vary greatly in their exploitation of the various senses and in the way in which they relate their conceptual apparatus to the various senses. It has been a commonplace that the ancient Hebrews and the ancient Greeks differed in the value they set on the auditory. The Hebrews tended to think of understanding as a kind of hearing, whereas the Greeks thought of it more as a kind of seeing, although far less exclusively as seeing than post-Cartesian Western man generally has tended to do. (Ong 1991 [1967]:26-7)

A number of ethnographic and comparative studies in this research tradition make similar claims, which are clearly at odds with the "vision-is-primary universalist" position associated with both Viberg's and Sweetser's research. Consider the following quotes:

> It was stressed to me that one cannot 'see' the motives, thoughts or intentions of another [in Ommura - N.E. & D.W.]. They are 'inside the ear'. As elsewhere in Papua New Guinea, intellectual processes, knowledge and

> memory are associated with the ear. The same verb 'iero' is used to mean 'to hear (a sound) and 'to know' or 'to understand'. (Mayer 1982:246)
>
> The Hausa word *gani* means 'to see.' One of the points about which my Hausa teacher, Mallam Garba Adamu, was insistent is that this word only means 'to see'. It is never used in the sense of understanding what a person means. (Ritchie 1991)
>
> The Tzotzil, the Ongee and the Desana each conceptualize the vital force of the cosmos in terms of a different sensory energy. ... In each of these cultures putting the cosmos in order ... involves putting the senses in order. ... The three cultures examined here can all be classified as oral cultures with regards to their dominant medium of communication, yet they are not all aural cultures. The Tozotzil symbolically orient themselves by temperature, the Ongee by smell. The colour-minded Desana, appear at first sight, to be as visualist as the West. (Classen 1993:135)

Another anthropological approach to perception which shares the relativistic stance of the "anthropologists of the senses", but emphasises the role of environmental, as opposed to strictly social, factors, is exemplified by the work of Gell (1995) and Feld (1990, 1996) and is rooted in the phenomenological tradition of Merleau-Ponty (1962, 1964). Based on ethnographic fieldwork in Papua New Guinea these authors, especially Gell, argue for a form of environmental determinism in the shaping, ordering and symbolic mapping of perceptions. Very roughly, this position claims that the environment a speech community inhabits (e.g. dense jungle versus open desert) will give differential access, in terms of strength and frequency, to various perceptual stimuli and as a result not only will different sensory modalities be dominant for the coding of the environment as a whole, but the whole nature of perceptual experience will be differently structured. These differences will then have consequences for the structuring of symbolic behaviour and everyday social interaction.

In contrasting these three traditions, it must be emphasised that Viberg, like Berlin and Kay (1969), investigated associations within one coherent semantic domain. In Matisoff's (1978) terms, the semantic changes investigated were all intra-field changes (i.e. both the original and extended meaning are in the same semantic field). However, the point of contention between researchers like Sweetser and the 'anthropologists of the senses' concerns trans-field associations in which perception is mapped to cognition. Thus, there are two separate issues to be considered: (1) within the field of perception verbs, do intra-field semantic associations in Australian languages reveal the same hierarchical ordering of perceptions (with 'see' at the top)? and (2) as far as extensions from perception to cognition are concerned, do Australian languages show a typical trans-field mapping of 'see' to 'know' (and to intellection at large) and 'hear' to 'understand' (and to basic internal 'speech' reception)?

In sum, then, the 'anthropologists of the senses' would predict that the Australian data should reveal cultural variation both with respect to hierarchical ordering of perceptions and with respect to trans-field mapping of perception to cognition. The cognitive linguistic position represented by Sweetser would predict that the Australian patterns of extension from perception to cognition will represent the "universal" patterns discovered on the basis of primarily Indo-European languages, and since this pattern would, from an experiential body-centered view, arise naturally from the universal hierarchical ordering of perceptions proposed by Viberg (with a verb higher on the perception hierarchy mapping to 'higher' cognition verbs indicating greater certainty), the same hierarchy should also be found in the Australian data. While others have read similar predictions into Viberg's findings, he himself has taken a more agnostic position: that "[a]t the presentation of this paper at Cascais, Paul Kay suggested ... that the hierarchy of polysemy would also predict which cognitive meanings would be assumed by the verbs of perception. A verb higher up in the hierarchy will tend to assume a cognitive meaning that expresses a higher degree of certainty. Unfortunately, I have not been in a position to check this idea systematically." (Viberg 1984:157-8); he goes on to say that we cannot determine whether

universal patterns exist "as long as there are no systematic data from a controlled sample" (Viberg 1984:158).

In the study that follows, we will show that patterns of extension of sensory verbs across perceptual modalities basically follow Viberg's law, with vision primary. On the other hand, the extension of verbs from perceptual to cognitive meanings is quite different from the Indo-European-based pattern studied by Sweetser: it is hearing, not vision, which regularly extends into the cognitive domain[2], going beyond the expected extension of 'hear' to 'understand', and on to 'know', 'think', 'remember' and other cognitive verbs; 'see' only extends rarely to cognitive verbs, and is more likely to extend to verbs for various sorts of social interaction ('flirt with', 'love', 'supervise/oversee'). Overall, then, our findings support a universalist position for strictly sensory verbs (i.e. the intra-field changes), but a culturalist position for their extension into the cognitive domain (i.e. trans-field changes).

3 Polysemy and semantic change: some assumptions and methods

It has become a standard assumption that semantic change from meaning A to B normally involves a transitional phase of polysemy where a form has both meanings (Wilkins 1981, 1996; Sweetser 1990, Heine 1997:82). What is articulated less often is that this phase of polysemy (i.e., what Heine calls the stage of overlap) is typically preceded by a phase where meaning B is only contextually implicated but not yet lexicalized as a distinct sense (cf. Traugott 1989). That is to say, meaning B often comes into existence because a regularly occurring context supports an inference-driven contextual enrichment of A to B. In these contexts, which we term *bridging contexts*, speech participants do not detect any problem of different assignments of meaning to the form because both speaker and addressee interepretations of the utterance in context are effectively, functionally equivalent (if semantically distinct). Subsequently this contextual sense may become lexicalized to the point where it need no longer be supported by a given context.

We are particularly interested in the pragmatics of 'bridging contexts' because we assume that this is where both universal and culture-specific factors actually drive semantic extension in contexts of interaction. In exploring bridging contexts, the primary question is: what recurrent contexts, and what cultural scripts, allow particular pragmatic extensions to occur with sufficient frequency that they get lexicalized as distinct, but related, meanings of a form? To answer this question we apply two methods of investigation. The first is to follow the classic philologist's approach and search for a textual context in which 'ces deux sens recouvrent leur unité' (Benveniste 1966:290). This entails a close attention both to textual occurrences of the verbs we are dealing with and to the sorts of image schemas that have become well-known in work on metaphor (e.g. Lakoff & Johnson 1980). The second approach is essentially anthropological and requires us to explore cultural contexts of use and articulate rules of pragmatic inference which make reference to particular cultural scripts. As Keesing (1979:27) has noted, "[p]ragmatic rules ... assume .. more general assumptions about the social and cultural universe without which they would be meaningless". Such cultural scripts will be invoked at the end of this paper, when we discuss why 'hear' rather than 'see' should give rise to cognitive verbs in Australian languages.

As an example, one important bridging context in the extension of 'hear' to 'recall, know, think about' is the context in many Australian Aboriginal narratives where travellers "hear the places" or "hear the way" in their travels, in the sense of hearing in their heads the recalled names of places along a route that had been sung or recounted to them previously; we discuss this in more detail in §5.3.5 and §7.4. To furnish examples of such a bridging context we need a good text corpus, and to make sense of it we must invoke both cultural scripts about the imparting of route knowledge (i.e. 'knowing a place

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[2] We are not the first to make this observation. Hercus (1992: 42), for example, remarks with respect to the Wemba-Wemba verb *nyernda* 'to know, to understand', formally related to *nyerna* 'to sit, to listen, to hear, to remember': 'This derivation, implying that 'hearing is knowing' is common in Australian languages and contrasts with the Indo-European method of expression 'I have seen', 'I know'.

and its location' means 'having heard the relevant songs and stories for that place') and general pragmatic rules for metonymically interpreting 'hear the place' as 'hear the name of the place'.

The relevant point for present purposes is that to understand semantic change we must focus on polysemy. Insistence on synchronic attestation of polysemy places strong constraints on postulated semantic changes, providing an important antidote to the unbridled imagination in discussing semantic change, while at the same time allowing us to place change under the microscope through the close study of lexical items in text and context. Through focusing on text and context one attempts to describe (or reconstruct) bridging contexts, the places where extended meanings commonly have their genesis, but to do this one must have sufficient information on cultural scripts and rules of pragmatic implicature.

A consequence of the above position is that different patterns of synchronic polysemy will engender different diachronic pathways of semantic change, and conversely that different pathways of semantic change reflect different patterns of polysemy in earlier *états de langue*. Universal patterns of semantic change should lead to very similar patterns of polysemy cross-linguistically, and forms with meanings that arise from such universal pathways should have comparable etymologies. On the other hand, crosslinguistically distinct polysemies will generate dissimilar semantic pathways and etymologies.

The different mappings of 'see' and 'hear' onto cognitive verbs in Australian and Indo-European languages, to be examined in detail later in the paper, are reflected in quite different etymologies between the two families. Fig. 1, based on materials in Sweetser 1990, illustrates the development of pIE *weid- 'see', whose reflexes retain their visual meaning in Slavic and Romance, but change to meanings associated with knowledge in Greek, Germanic and Celtic:

pIE *WEID- 'SEE':
Greek: *eidon* 'see', perf. *oida* 'know' > Eng. *idea*
Dutch: *weten* 'know'
German: *wissen* 'know'
Russian: *videt'* 'see'
English: *wise*, *wit*
Latin: *video* 'see'; Italian: *vedere* 'see'.
Irish: *fios* 'knowledge'

Fig. 1. Some developments of pIE *weid- 'see' (After Sweetser 1990)

In contrast, the 'see' verb reconstructable for proto-Australian as **na-* (with development to **NHaa-* in proto-Pama-Nyungan - Evans 1988) only has a clear development to 'know' in one language in the extreme south, Kaurna; the development to 'think' in Guugu Yimidhirr may be mediated by the 'hear' meaning it also develops. Elsewhere **na-* retains its visual sense or develops in the direction of such meanings as 'find'[3]:

[3] Sources for the languages cited, and their geographical locations on the continent, are given at the end of this paper.

proto-Australian[4]	**na-*	'see, look at'.
non-Pama-Nyungan languages:		
Paccamalh:	*na-*	'see'
Burarra:	*na-*	'see, look at, read'
Mayali:	*na-*	'see, look at'
Dalabon:	*na-*	'see, look at'
Nunggubuyu:	*na-*	'see'
proto-Pama-Nyungan	**NHaa-*	'see, look at'
Yidiny:	*nyaki-*	'look at, see'
Guugu Yimithirr:	*nhaamaa*	'see, look, hear, **think**'
Gugu Yalanji:	*nyajil*	'perceive, hear, see'
Jiwarli:	*nhanyangku*	'to see, to look, to look at, to watch'
Ngarluma:	*nhaku(-ku)*	'to see'
Pitjantjatjara:	*nyanganyi*	'see, watch, look at, find'
Warlpiri:	*nyangu*	'see; to watch; look at; perceive; determine; find out'
Jaru:	*nyangan*	'to see, watch'
Kukatja:	*nya-*	'to see, look at, watch; look for; diagnose'
Warumungu:	*nya-*	'to see, look at, to look for, search for'
Muruwari:	*nha-*	'to see, look at, observe'
Kaurna:	*nakkondi*	''to see, look; to **know**'
Djinang:	*nyangi*	'see; observe; read; perceive; shine; inspect'

Fig. 2. Cognates of pA *na- 'see, look' and proto-Pama-Nyungan *NHaa- 'see, look'.

It appears that 'hear' never develops 'know' or 'think' meanings in Indo-European, though it sometimes develops to 'obey' (Danish) or 'attend to' (Swedish). For instance, Classen (1993:59) writes:

> Significantly, auditory terms rarely serve as metaphors for thought or intelligence in English. ... This is perhaps because hearing is conceived of as a passive sense, receiving information but not probing it. Therefore, rather than being associated with intelligence, hearing is associated with obedience. The word obedience, indeed, is derived from the Lautin audire to hear. So if hear is to obey, to obey is also to hear.

Figure 3 shows the etymological set for pIE * k^leu-, * k^leu-s- 'hear'.

C.Greek:	*klúo* 'hear', *kléos* 'report, fame, glory'
Old Church Slavic:	*slovo* 'word'
Latin:	*clue:re* 'be called, be famous'
Welsh:	*clywed* 'hear'; Breton: *klevout* 'hear'
Gothic:	*hliuma* 'hearing'
Old Danish	*lytte* 'listen; Modern Danish *lyde* 'obey'
Old English	*hlu:d* 'loud'; Dutch *geluid* 'loud'
Old English	*hlyst* 'hearing' > OE *hlystan* > Modern English *listen*
Swedish	*lystra* 'attend to', Danish *lystre* 'obey'

Fig. 3. Developments of pIE * k^leu-, * k^leu-s- 'hear' (data from Buck 1949)

Although there are many individual examples in Australia where 'hear' extends to 'think' and 'know' (see §5.3), we have not yet identified a 'hear' etymon with wide attestation in Australia, and so cannot show a fully comparable etymological set

[4] In fact this root may not be attributable right back to proto-Australian, since it is absent from all Western non-Pama-Nyungan languages: it is not found in any languages of the Kimberley, or of the Daly region (except Paccamalh, which has more easterly genetic affiliations).

demonstrating the different pattern of extension. However, examination of proto-Pama-Nyungan **pina* 'ear' and its derivatives, which are often verbs meaning 'hear/listen', illustrates the frequency with which these cognitive meanings develop across the etymological set. See Figure 4.

Ngaanyatjarra: *pina* 'ear'; Gamilaraay: *pina* 'ear'; Warrgamay *pina* 'ear'; Bandjalang *pinang* 'ear', etc.	
Yidiny:	*pina* 'ear'; *pina-N* 'hear; listen to; **think about**; **remember**'
Muruwarri:	*pinathina-* to hear; to listen to
Guugu Yimidhirr:	*pinaal* (adj.) 'smart, clever, **know**' ;
Gugu Yalanji:	*pinal* 'to **know**'
Nyangumarta:	*pina karri-nyi* [lit. 'ear-stood'] 'he heard it, he understood it, he obeyed him, (of cold air); he felt it'
Warlpiri:	*pina* 'wise; **knowing**; experienced'; *pinarri* 'wise; **knowledgeable**; smart; *pina-wangu* [~-without] '**ignorant**'; *pina(pina)(ri)-jarrimi* 'to learn'; *pina(pina)-mani* 'to teach'
Jaru	*pina yungan* [lit. ear put] 'to learn', *pinarri* '**knowing**'
Gooniyandi[5]	*pinarri* '**know**; **knowledgeable**'
Warumungu	*pina-* 'to hear, listen to, understand'

Fig. 4. proto Pama-Nyungan *pina 'ear' and some of its derivatives. [6]

Our discussion of 'bridging contexts' above predicts that such systematically different patternings in polysemy and etymology would reflect differences in cultural traditions. Here we face the broader task of gathering, and contextualizing, attestations in different languages and language areas; this is particularly important for typological work which depends on a large data base to show recurrent regularities and implicational relationships. We know from studies of other lexical domains that polysemy exhibits strong areal patterning in Australia - sometimes at the level of the whole continent as opposed to elsewhere in the world, and sometimes at more local levels, such as the Lake Eyre Region (Austin, Ellis & Hercus 1976) or the Cairns Rainforest (Sear 1995). Where relevant we will discuss the areal distribution of patterns, to avoid the pitfall of projecting an 'Australian pattern' which may in fact be more local. Nonetheless, it turns out that most of the patterns we discuss in this paper are Australia-wide rather than being found in specific areas, except for the 'see - hear' polysemy which is largely confined to Cape York.

One important caveat must be made here: the distribution of good lexicographic, ethnographic, and textual materials is far from uniform, partly reflecting the chronology of white impact on Australia (with the southern regions poorly represented due to early language loss) and partly reflecting local research traditions. For instance, we currently have half a dozen good published dictionaries for Central Australia, but only one for the Kimberley region and none for the Daly (cf Goddard & Thieberger 1997). The potential of this skewing to produce spurious areal patterns must be borne in mind.

As well as examining patterns of polysemy, we will also investigate semantic extensions accompanying derivation, such as change of gender or reduplication. Strictly speaking this is heterosemy (Lichtenberk 1991) - a relation in which related (often identical) forms and their different, but related, senses belong to different morphosyntactically-determined grammatical categories. In polysemy, there is one lexeme with several related senses, in heterosemy there are two or more related lexemes each with a sense that clearly shows semantic affinity. As an example of "pure" (zero or underived)

[5] This is the only non--Pama-Nyungan language in the set; it is possible that *pinarri* is a loan from the neighbouring Pama-Nyungan language Jaru.

[6] Since the vast majority of Australian languages do not have a voicing distinction in stops, we have given all the forms in this table with an initial 'p', even though in the orthographic conventions of some of the languages the words might actually be written with a 'b'.

heterosemy, we find in Yidiny (Dixon: 1991) that the root *bina* as a nominal means 'ear; gill on fish', but as a particle it means 'I thought something was the case, but it is not'. In addition there is a verb *bina* (in the N-conjugation) which means 'hear; listen to; think about; remember'. Similarly, in Jiwarli (Austin 1991), *kurlga* as a nominal means 'ear' but as a particle it means 'remember'. Although some semanticists (e.g. Lehrer 1990) extend polysemy to cover such situations, in principle one should track polysemy independently of heterosemy. But our reason for including such evidence here is that time and again we find parallels where one language's polysemy is another language's heterosemy. Consider the following semantic extension of 'eye', which is heterosemous in the Gun-djeihmi dialect of Mayali, but polysemous in the Kune dialect (which lacks noun class distinctions).

	Gun-djeihmi	Kune
'eye'	*gun-mim* [*gun-* is neuter prefix]	*mim-no*
'fruit, seed'	*an-mim* [*an-* is vegetable prefix]	*mim-no*

Figure 5: Heterosemy (in Gun-djeihmi) vs. Polysemy (in Kune)

Examples of such parallelisms could be multiplied at length (see Evans 1997 for further examples from the domain of animal/plant metonymies); essentially one can see the use of gender prefixes here as making explicit the domain within which a particular metaphorical extension is to be sought, e.g, the domain of plants for 'fruit, seed' (i.e. think of something 'eye'-like in the domain of plants); a language that has polysemy *sensu stricto* simply leaves the corresponding domains implicit.

In the present study we will encounter four main formal patterns of derivation.[9]

Firstly, reflexives and other detransitivized forms of verbs are used to derive both one perceptual sense from another (preeminently 'feel' from 'hear') and cognitive senses from perceptual ones (especially 'think' from 'hear'). An example is Yukulta *marrija* 'to listen, hear', whose reflexivized form *marriija* means both 'to feel' and 'to think'.

Secondly, reduplication is often used to derive cognitive senses from perceptual ones (e.g. 'think' from 'hear'), as well as indicating duration of perception, which may implicate agentivity (see the discussion in §4.1.1 of reduplicated senses of 'hear' in Dalabon, which may implicate 'listen' via the general sense of 'hear over a long time').

Thirdly, incorporation or collocation of nouns is a frequent device for shifting sense modality, e.g. 'see a smell' or 'smell-see' for 'smell', or 'hear a taste' or 'taste-hear' for 'taste'; note that accommodation of the perceptual modality of the lexical verb must be made anyway in order to account for the interpretability of the resultant predicate.

Finally, compounds or coverbal constructions such as 'eat smell' for 'taste' may be used. Here it is less clear that the semantic extension resides in the verb rather than being added by the compounding element or coverb. For instance, with respect to the Arrernte cognition terms *ite-le-areme* (throat-INSTR-see) 'know; realise; remember; think; decide' and *irlpe-angkeme* (ear-speak) 'remember', which are historically compounds, it is unclear whether we are dealing with a semantic extension of just one element or of both elements in the compound, or of the unified compound itself (cf. Van Valin and Wilkins 1993:518-527).

Although the bulk of the data we present in §4 and §5 comes from the everyday speech register of Australian languages, in §6 we will demonstrate that the major patterns we have uncovered are recapitulated in other semiotic systems, including respect registers, initiation languages, and auxiliary manual sign languages.

[9] While, theoretically, there are probably good reasons for distinguishing *heterosemy* - meaning differences tied to category differences - from derivational "polysemy" - meaning differences tied to the presence of other signs, in practice it is not always obvious when a marker (like a conjugation class marker) is merely reflecting category status or functioning to derive a root into the category. As such we currently lump heterosemy and derivation together for the purposes of this investigation.

4 Intrafield Polysemy across sensory modalities

In this section we examine intrafield polysemy across the five sensory modalities within the semantic domain of perception verbs; in §5 we turn to trans-field mappings of sensory meanings onto cognitive meanings.

4.1 Viberg's grid of perception verbs

The definitive study of polysemy in the domain of perception verbs is Viberg (1984), a pioneering cross-linguistic survey to which the present study owes a great deal. Viberg's aim was to examine, from a typological point of view, the lexicalization patterns within a specific semantic field. His study examined the results of questionnaire data on perception verbs from "53 languages representing 14 different language stocks from all the major parts of the world" (Viberg 1984:124). No Australian languages were included in that sample, so one aim of this paper is to assess Viberg's claimed universals from the perspective of another language family.[10] We will stick closely to Viberg's own form of discussion, by looking first at the patterns of lexicalization and grammatical treatment within the system of perception verbs in this section (i.e. §4.1) and then at the patterns of verbal polysemy across sensory modalities in §4.2.

Viberg sees a semantic field as being structured by the interaction of field-specific semantic components and general field-independent components that cut across all semantic fields in the same word class (in this case verbs). He writes (1984:122):

> As for the field of perception, the most important field-specific components are the five sense modalities: *sight*, *hearing*, *touch*, *taste*, and *smell*. The most important general components are called *activity*, *experience*, and *copulative*.

Against this background, Viberg begins by setting up a 5 x 3 grid arraying the five main perceptual modalities against three general event type representations of perception: as controlled activity ('she looked at the painting', 'he felt his daughter's brow for signs of fever' etc.), as non-controlled experience ('she saw the painting', 'he felt blood running down inside his shirt'), and as a source-based copulative (state) construction from which the perceiver is omitted ('the painting looked very old', 'his daughter's brow felt feverish'). As is well-known, in English, the activity series allows the progressive in the present but the experience series does not: 'she is looking at the painting', but *'she is seeing the painting'.

In English no verbs are polysemous across sensory modalities, but several are polysemous across two ('look') or all three ('feel', 'taste', 'smell') event types, as shown by Fig. 6:

[10] Viberg did use a few published sources to glean some unsystematic lexical data for a couple of Australian languages, but he did not gather any information on full systems, and does not count such languages in his typological base of 53 languages. He acknowledges (1984:124) that "[a]lthough this is a fairly good sample, it is not satisfactory, since European languages are overrepresented and some areas, such as North and South America and Oceania, are highly underrepresented."

	Activity (Controlled)	Experience (non-controlled)	Source-based copulative (state)
sight	look at	see	look (S.COMP)[11] She looks cold.
hearing	listen to	hear	sound (S.COMP) He sounds tired.
touch	$feel_1$	$feel_2$	$feel_3$ (S.COMP) The wood feels smooth.
taste	$taste_1$	$taste_2$	$taste_3$ (S.COMP) The meat tastes strange.
smell	$smell_1$	$smell_2$	$smell_3$ (S.COMP) She smells soapy.

Figure 6: The Viberg grid for perception verbs.

Needless to say, the above set contains only the most basic verbs, and these may have a considerable number of hyponyms: for instance, 'look at', in English, has the hyponyms 'peer at', 'peep at', 'stare at', 'scrutinize' and many others. Basic perception verbs in Australian languages also often have many hyponyms. Thus, in Kayardild, *kurrija* 'see; look at' has the hyponyms *miburiya ngudija* 'glance at, cast one's eye upon', *walmurrija* 'look up in the sky', *warayija* 'look back', *yarmarutha* 'look down at', *rimarutha* 'look eastwards at' and many others (Evans 1992b:326). Similarly, in Dyirbal, *bural* 'see, look at' has the hyponyms *wabal* 'look up at', *barrmil* 'look back at', *walgiy* 'look over or round something at', *ruygiy* 'look in at', *rugal* 'look at something going past', *wamil* 'look sneakily at, spy on', *ngarnyjay* 'stare at', and some half-a-dozen more (Dixon 1980:106). In the current paper, as in Viberg's, our focus is restricted to the basic set of general superordinate verbs; i.e., what Dixon (1982), on the basis of Australian data, has identified as 'nuclear' (as opposed to 'non-nuclear') verbs (cf. §6).

Another limitation on the data, in our own study as in Viberg's, is the simplifying assumption that there are merely five sensory modalities. In fact, a good case can be made for at least one further modality: proprioception, or internal feeling, as opposed to external touch. This sixth modality is expressed distinctively in many Australian languages. Thus, among the set of basic perception verbs in Arrernte we find *welheme* 'have a (proprioceptive) feeling, feel (cold; sick; hot; etc); feel something doing something to you' This verb is clearly distinct from the verb *anpeme* 'touch; feel by touch; feel (rough; smooth; etc.)'. Historically, the verb *welheme* 'feel (proprioceptive)' appears to have its origins in the reflexive form of the verb 'to hear' (*aweme*). In Warlpiri 'feel (proprioceptively)' is synchronically an extension of 'hear', again using the reflexive, whereas 'feel by touch' uses another verb (§3.2.2). We refrain from adding this sixth modality merely because too few sources discuss it to make a comparative study possible.

We should also mention that in traditional Aboriginal societies there is a widespread belief that certain types of information and knowledge can be gained by extra-sensory perception. Certain powerful individuals may be specially clairvoyant, and any individual may experience premonitions of future events through their dreams. In addition, many Australian languages have a large set of expressions for different types of 'telaesthesia', which Douglas (1977) defines as 'the supposed ability to acquire information about distant happenings or forthcoming events through the interpretation of certain physical disturbances in the body'. Examples from the Western Desert language are *takalarrara* 'crackling in nose indicating the coming of a visitor or event', and *niirnakatira* 'whistling in the ears indicating that elder brother is thinking of the person' (Douglas 1977:5; see also Peile 1997:90-91). From the little evidence that is available, it appears that much of

[11] 'S. COMP' stands here for 'subject complement': the source-based constructions are only grammatical with an overt subject complement, e.g. 'She looks TIRED', 'he sounds DRUNK'. They may take an overt experiencer as an optional NP with 'to X': 'She looks tired to me' or 'To me she looks tired'. In English these two syntactic features are unique to the source-based set and can thus be used to establish the combinatorial distinctiveness of these senses.

the talk surrounding extra-sensory perception is related to basic perception. For instance, in some Australian languages (e.g. Arrernte), dreams, even premonitory dreams, are said to be 'seen' (i.e. described using the basic verb for 'see; look at'). Furthermore, in 'telaesthesia' the basic bodily feeling that makes one aware of a distant happening is often described using the verb of proprioceptive feeling, whereas the overall clairvoyant experience it leads to may be described using a derivative of the verb 'to hear; listen; understand'. For instance, the ninth distinct sense of *kulini* 'hear; listen' given in the *Pitjantjatjara/Yankunytjatara to English Dictionary* (Goddard 1992) is "Have a premonition from a sensation in the body."[12] Similarly, in Kukatja, the term *kulil-kulilpa* 'clairvoyance; insight into some future event; an unusual feeling that something is going to happen' is derived from the verb *kulila* 'hear; listen; understand; think; recognise; obey' (Peile 1997:49; Valiquette 1993).[13] For the moment, we will assume that extra-sensory perceptions are treated as hyponyms of different basic perception verbs, with further semantic components pertaining to particular types of information conveyed. Again because of the paucity of full lexicographical treatments, we do not consider this interesting set further here.

As we shall demonstrate in the discussion which immediately follows, the data itself leads to a more radical form of simplification. In the following section we show that Australian languages systematically fail to make a lexical distinction between the three event types, using constructional differences to make the semantic distinction where necessary: typically, they lexically conflate the activity and experience types (though there are contexts such as imperatives and iterative reduplications in which the activity reading predominates), and use a secondary predicate construction with overt perceiver for the source-based stative set . The following section is therefore an excursus showing how these three event-types are lexically conflated and constructionally distinguished, beginning in §4.1.1 with the distinction between activity and experience senses, and proceeding to source-based senses in §4.1.2; at the end of it we shall be justified in grouping all three types together for each semantic modality.

4.1.1 Activity vs Experience

The lack of a systematic distinction between activity and experience verbs of perception is widespread in Australian languages. Dixon (1979:104-105), in arguing that the uncontrolled (experience) verbs 'see' and hear' tend to be treated grammatically in the same way as their controlled (activity) counterparts, writes:

> Support for this line of argument comes from Australian languages, which have a single verb covering both 'see' and 'look at', and another for 'hear' and 'listen to'. That is, a single lexical root is employed to describe chance or involuntary perception, and also for purposeful directing of attention; in the latter sense, these verbs can of course be used in the imperative form. Almost all Australian languages show this pattern.

The only Australian language we know of that makes a systematic distinction between the activity and experience event types in perception is Paakantyi (see below). In keeping with Dixon's argument, the lack of a lexical distinction between activity and experience types does not mean that there are no hyponyms with specific volitional interpretations - see many of the Kayardild and Dyirbal verbs discussed above - merely that the most basic perception verbs do not exhibit this distinction.

In no language we have examined is there a clear cut test comparable to the English progressive test which distinguishes activity from experience. Creoles based on English

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[12] The following example of this sense is provided in the entry: *"Ngayulu muṯi nuunpungkunytjala kulini.* I'm having a premonition from my knee twitching" (Goddard 1992:39).

[13] Peile (1997:49) goes on to explain that:
"Having a feeling about something," may be expressed with the verb, *pinalkarrala*, the root of which is the noun, *pina*, ear. The verb is similar, but not identical to *kulil-kulilpa*, which specifies some sort of insight into some future event.

also neutralize the distinction: in Krio *i bin lukim* may mean 'he saw him' or 'he looked at him', and *lijin* (< listen) may mean either 'hear' or 'listen'. We therefore assume that there is just a single lexical sense here, vague with respect to degree of control, and this is in fact the practice of most dictionaries of Australian languages, as the various glosses cited in this paper will attest. We adopt the practice of using the English verb for the non-controlled event type in the interlinear gloss, but the more specific and contextually appropriate verb in the free translation.

Nonetheless, there are a number of contextual clues which favour one reading to the extent that translations choose between e.g. 'see' and 'look at' in a regular way. After imperatives, for example, an activity reading is normal (natural given the implication that the activity is under the addressee's control), and after negatives of ability the experience state reading is normal. The two differing translations of Kayardild *marrija* in (1) below illustrate this clearly.

(1) K[14]

dathina	*waldarra*	*dathinananganda*	*marralda*	*kuwajuwaa-j,*
that	moon	that.way	ear	twist-NFUT

can't	***marri-j,***	*kurndumaand.*	*'Kiija-tha*	*ngijinda*
can't	hear-NFUT	stoops.forward	draw.near-IMP	my

kangka	*kurulu-tha*	***marri-j,***	*kurulu-tha*	*kiija-tha*	*bathind!'*
words	properly	hear-IMP	properly-IMP	draw.near-IMP	from.west

'That (new) moon twists his ear like this, but can't **hear**, he's stooping forward with his hands behind his back. "Come close and **listen to** my words properly, come right up close from the west!"'

Imperfective aspect, continuous aspect and iterative reduplications favour the activity reading, since activities tend to last longer than uncontrolled (involuntary) perceptions. This is illustrated with parallel examples from Arrernte (2) and Mayali (3).

(2) A

The	*nge-nhe*	*are-rlane-tyame*
I	you	see-CONT-PPr

'I was watching you' [interpretation linked to continuous aspect]

(3) M

ø-nangah-na-ng.
I/you-ITER-see-PP

'I was watching you.' [interpretation linked to iterative reduplication]

An even clearer case of reduplication aligning with an activity reading is found in Dalabon. The verb *-wonan* , used without reduplication, normally has the sense 'hear', as in (4), (though see below for some extensions to 'understand'), while the reduplicated form usually has the sense 'listen', as in (5). It seems, however, that this difference falls out from the more general meaning of reduplication, which is persistence of the activity over time, since this is a natural correlate of listening but not of hearing. This is confirmed by the fact that *wona-wonan* will also be used for sensations drawn out over time, as when one hears dingoes calling out all night long (6).

(4) D

Dah-wona-n	*kahmon?*
you/us-hear-PR	good

'Can you hear us O.K.?'

(5) D

bulh	*kanihdja*	*kah-walkka-walkka-rr-inj*	*bulu*	*kah-yang-wona-wona-ninj*
there		3-hide-REDUP-RR-PP	them	3-language-REDUP-hear-PI

'He hid himself away there, and listened to them talking.'

[14] Throughout this paper we use abbreviations to identify the language of example sentences. These are listed at the end of the paper.

(6) *kah-djal-ng-nawoydo-duninj* *budjkvh-budj-kvn,*
D 3-just-SEQ-dingo-REALLY REDUP-bush-GEN

yilah-yang-wona-wona-n *yale-yu-yu.,*
we-talk-REDUP-hear-PR weSUB-REDUP-sleepPI

warrvkkvn *yale-yu-yu.*
before weSUB-REDUP-sleepPI

'They were real bush dingoes, we heard their howls as we were sleeping, before as we were sleeping, ...'

Another form of construction which favours a controlled activity reading is one which explicitly codes intent or volition. In a number of Australian languages, for instance, a dative-marked NP can replace what would normally be the absolutive-marked object of a transitive verb to indicate that the subject is attempting to perform the action with respect to the entity, but has not yet succeeded in his attempt. Perception verbs in this construction will tend to be interpreted as 'look for', 'listen out for', 'feel around for', 'taste for' and 'try to catch the scent of'. Compare the following Arrernte examples. In (7), the sentence is ambiguous between 'hear' and 'listen', but with the 'Dative of Attempt' construction in (8) purposeful direction of attention is entailed (cf. Wilkins 1989:180-181).

(7) *Kweke* *nhenhe-le* *arrpenhe* *mape-Ø* *awe-me*
A little this-ERG other mob-ABS hear-NP
'This little one hears / is listening to the others.'

(8) *Kweke* *nhenhe-le* *arrpenhe* *mape-ke* *awe-me*
A little this-ERG other mob-DAT hear-NP
'This little one is listening out for the other ones.' [i.e. Trying to hear when they're coming.]

As we mentioned above, to our knowledge there is just one Australian language that makes a systematic distinction between activity and experience verbs. In Paakantyi: (Hercus 1982:191; 1994) there is a stem-forming suffix *-la* which is linked in various ways with transitivity and intention. According to Hercus, "it focuses attention on the aims of an action, it makes an action definite rather than haphazard, and it is often best interpreted as conveying the meaning 'with intent'." With perception verbs, it creates the pairs:

bami- 'to see' *bami-la-* 'to look at; watch'
dhaldi- 'to hear' *dhaldi-la-* 'to listen'.

The sensory modality most commonly privileged with a distinct volitional verb in Australian languages is 'smell': many languages have a word glossed as 'sniff, smell' which can only be used of controlled, volitional perception; an example is Kayardild *bamatha* 'sniff, smell, take a breath'.

4.1.2 Source-based terms

The expression of the source-based series in Australian languages has largely been ignored; no dictionary provides this series for the full set of 5 sensory modalities and only a few dictionaries provide any source-based expressions.[15] We have therefore had to

[15] The *Eastern and Central Arrernte to English Dictionary* (Henderson and Dobson, 1994) is one of the few dictionaries to discuss source readings for at least some of the perception verbs. The third sense they identify for the verb *areme* 'see; look' is 'look to be a certain way (e.g. look sick), appear that way'.

rely, in this section, primarily on our own field notes and on the discussion of Warlpiri in Laughren (1992).

The treatment of source-based perception terms in the languages for which we have been able to get data is systematically different from English. Four types of construction are employed:

4.1.2.1 Use of secondary predicate construction with overt experiencer

English constructions like 'John looks tired', 'Mary sounds excited' etc. are 'covert deictics' (Fillmore 1971) in the sense that their full semantic representations require an explicit judge of the complement state: 'John looks tired (to me / to us)'. With a subset of perception verbs, Australian languages typically employ a secondary predicate construction here, where the perceptual judge appears as subject, the source of the stimulus as object, and the judgment as a secondary predicate on the object; in Kayardild (exx. 9-11), Arrernte (exx. 12-13) and Warlpiri (exx. 14-15) such secondary predicates agree in case with the object.[16] Examples are:

(9) *ngada* *kurri-ja* *niwan-ji* *mibulk-i.*
K 1sgNOM see-NFUT him-OBJ asleep-OBJ[17]
'I saw him asleep'; 'he looked asleep to me'.

(10) *malangarrba-ya* *ngada* *marri-ja* *dathin-ki* *dangka-y.*
K drunk-OBJ 1sgNOM hear-NFUT that-OBJ man-OBJ
'That man sounded drunk to me.'

(11) *ngada* *karrma-tha* *dangka-ya* *murldi-n-ki*
K I grasp-ACT person-OBJ be.soft-N-OBJ
'This person feels smooth to me, lit. I grasped this person soft.'

(12) *the* *Margie* *lhwarrpe* *are-me*
A I(ERG) M (ABS) sad(ABS) see-NP
'Margie looks sad to me'; lit. 'I saw Margie sad.'

(13) *the* *merne* *arrkerne-ke* *mwarre*
A I(ERG) food(ABS) taste-PC good(ABS)
'The food tasted good to me.' OR 'I could taste that the food was good': lit. 'I tasted the food good.'

(14) *maju* *ka-rna* *nya-nyi* *nyampu* *turaki*
W bad PRES-1sg see-NP this car
'I see that this car is bad/ this car looks bad to me.' [Laughren p.c.]

(15) *nganimpa-rlu=rnalu* *flour* *paja-rnu* *ngurrju*
W 1pl.exc-ERG=1pl.exc.SUBJ flourABS taste-PST goodABS
'We tasted (that) the flour (was) good', 'we tasted the flour (and it was) good.'
'The flour tasted good (to us).'

A variant of this strategy involves the omission of the subject, but with the source still in object function. Arrernte employs this strategy with both *areme* 'see; look' and *arrkerneme* 'taste' [see footnote 12]. While (13) above is vague as to whether it has something more like an experience (non-controlled) reading or a source-based state

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They note that "the one who looks a certain way is really the Object of the verb. Nothing is mentioned as doing the looking". Similarly, one of the senses they give for *arrkerneme* 'to try to do; test; taste; imitate' is '(food etc.) taste a certain way'. Again they note "The food here is actually the object of the verb; the one(s) doing the tasting are not mentioned."

16 Melissa Bowerman (p.c.) tells us that her children made systematic errors in English along these lines: 'Will *I* see it red?' 'Will *I* taste it good?' etc.

17 These glosses simplify the complexities of object marking in Kayardild - see Evans (1995) for full discussion.

reading, example (16), in which the subject is omitted, clearly has a source-based interpretation. In contrast, example (17a) is interpreted in the controlled activity reading primarily because it has both an overt subject and a dependent clause which implicates intent.

(16) *Merne* *arrkerne-ke* *mwarre.*
A food(ABS=O) taste-PC good(ABS)
'The food tasted good.'

(17) *Gavan-le* *merne* *arrkerne-ke* *mwarre* *peke* *arlkwe-tyenhenge.*
A Gavan-ERG food(ABS) taste-PC good maybe eat-SBSQT
Gavan tasted the food to see if it was good to eat.

The set of sensory modalities allowing this form of secondary predicate construction varies from language to language, but always includes 'see'. In Kayardild it is attested with 'see', 'hear' and 'touch, grasp'; in Arrernte and Warlpiri with 'see' and 'taste'. Note also that this is not the only meaning associated with this construction - with 'hear' as main verb another interpretation is 'hear X is/was ADJ' in Warlpiri, for example, and it is not translatable with a perceptual source sense [Laughren p.c.]:

(18) *Kuja-rnalu* *Japanangka* *purda-nyangu* *nyurnu*
W COMP-we.exc J heard dead
'When we heard (that) J (was) dead'
* 'When J sounded dead to us.'

4.1.2.2 Use of periphrastic constructions

For modalities which do not allow a secondary predicate construction to convey a source-based reading, the normal construction in some languages is a periphrastic one placing a perception verb in one clause and the adjective describing the state of the source in the other. In Arrernte this is the case with *aweme* 'hear; listen' and *anpeme* 'touch; feel'. Two Mparntwe Arrernte examples are:

(19) *Ampe* *kweke* *urinpe* *ne-ke,* *renhe anpe-rlenge*
A child little hot be-PC, 3sgACCtouch/feel-DS
'The baby felt hot.'; lit. 'the baby was hot when it was touched.'

(20) *Ampe* *kweke* *awe-rlenge,* *rlkerte-arteke* *ne-me.*
A child little hear-DS, sick-SEMBL be-NP
'The baby sounds sick.'; lit. 'listening to the baby, it's as if it's sick.'

Note that in the above Arrernte examples, the perception verbs are in a dependent subjectless clause in which the source is the object, and the main clause is a copular clause with an adjectival complement and the source is the (understood) subject. Because the subject of the main clause is the 'source', while the unmentioned (supressed) subject of the dependent clause is the 'experiencer' (i.e. perceptual judge), the dependent clause is marked with the switch-reference suffix for Different Subject (cf. Wilkins 1988).

4.1.2.3 The uniqueness of 'smell'

Only for 'smell' have we found languages in which the same verb can be used for source-of-perception with source as subject and also for activity and experience event types with perceiver as subject. That is to say, the same verb can take either 'source' or 'perceiver' as subject, with a corresponding difference in event-type reading. Thus Kayardild *banyjija* can be used as an experiencer-based verb, as in (21-22), but also as a source-based verb (23-25); in the latter case it is typically nominalized and compounded with an adjective of smell-evaluation. In the experiencer-based (activity and experience) sense a formally related verb *barndija* or *bandija* may also be used; this cannot participate in the source construction.

(21) *banyji-ja* *diya-ja* *ngada* *barrngka-y*
K smell-NFUT eat-NFUT 1sgNOM lily.root-OBJ
'I tasted the lily roots.' lit. 'I smelt ate lily-roots.'

(22) *ngada* *bandi-ja* *buka-ya* *wuran-ki*
K 1sgNOM smell-NFUT rotten-OBJ food-OBJ
'I smelt rotten meat.'

(23) *dathin-a* *nguku-wa* *buka-banyji-n-d*
K that-NOM water-NOM rotten-smell-N-NOM
'That water smells rotten.'

(24) *dathin-a* *dangka-a* *wadu-banji-n-d*
K that-NOM man-NOM smoke-smell-N-NOM
'That man smells of smoke.'

(25) *dathin-a* *maku* *bitharri-banji-n-d*
K that-NOM womanNOM good.smelling-smell-N-NOM
'That woman smells good.'

Such linking alternations, where the same thematic role is linked with the subject in an intransitive construction and the object in a transitive construction, are highly unusual in Australian languages[18]: in Kayardild, for example, *banyjija* is the only verb with such an alternation. Worms (1942) mentions this alternation in the West Kimberley languages Garadyare (Karajarri), Yaoro (Yawurru) and Nyegena (Nyigina); other languages with this alternation include Gupapuyngu (*nhuman* 'smell, sniff around, give off a nice or nasty smell') and Djinang *nyumiki* 'give off an odour; stink; smell an odour'. We return to this point in §4.2.5 below, where we relate it to the relative salience of the source as opposed to the perceiver with 'smell' verbs, as opposed to those in other sensory modalities.

This absolutive pattern of argument alternations has given rise to two cognate sets which, again unusually for Australian languages, involve linkages of a single thematic role to objects in some languages and subjects in others.

In one set, a verb whose most likely original form was *bany-rdi* /baɲ-ɖi / [smell-stand][19] in proto-Gunwinygo-Pama-Nyungan,[20] with an original source-based 'smell' meaning, has undergone phonological simplification variously to *banyji, banji, bandi,* and *barndi* in various descendant languages, with semantic shift to experiencer-based 'smell$_{1/2}$' in some. In Kayardild the pair *banji-ja*[21] */ bandi-ja* ~ *barndi-ja* apparently represents two alternative assimilations each linked with a different meaning.

SOURCE-BASED SMELL$_3$:
Gunwinyguan: Jawoyn (Gunwinyguan) *bany-ciyi-* 'to smell (good), give off an odour', Mayali *bany-di-* 'there be a bad smell', Nunggubuyu *wanyja-* 'to smell (intr.), to emit a smell; to stink, to smell bad'
Tangkic: Kayardild *banyjija* 'smell$_{1/2/3}$', Yukulta *panyjija* 'to smell (intr.)'.
Pama-Nyungan: ; Warumungu (Pama-Nyungan) *parnta-* to smell (intr.), Ngarluma (Pama-Nyungan) *parnti(-ku)* to smell, to have odour

[18] See Evans (1989) and Austin (1992) for further discussion of the semantics of transitivity alternations in Australian languages.
[19] The etymologically original structure and meaning of this proto-form is preserved in, inter alia, Jawoyn and Mayali.
[20] The Gunwinyguan languages, along with Tangkic and Karrwan, are the closest relatives of the widespread Pama-Nyungan language family; the hypothetical proto-language referred to here is the putative ancestor of these four subgroups. See Evans & Jones 1997 for discussion.
[21] Phonemically / baɲɖiɖa /; the cluster *nyj* is simplified to *nj* in the practical orthography.

EXPERIENCER-BASED SMELL$_{1/2}$:
Gunwinyguan: no examples with this meaning.
Tangkic: Kayardild *bandi-ja ~ barnti-ja* 'smell, perceive by smell'; *banyji-ja* 'smell$_{1/2/3}$', Lardil *banji* 'to smell (perceive odour of)'.
Karrwan: *banjawa* 'smell (tr.)'
Pama-Nyungan:
Muruwari *pathi-* 'to smell, sniff', Pitjantjatjara *parnti* n. 'scent, odour', *parntinyi* 'give off a smell, scent', *parntini* 'smell, sniff',
Further development, presum. via 'sniff out', in Paakantyi: *parnta-* 'to search, to look for, to come out'.

There are also languages, all Pama-Nyungan, where the source meaning is a nominal or predicate nominal, and the activity meaning a derived verb; or where there are two verbs, with the activity meaning clearly derived from the source meaning: Diyari: *parni-* 'to be odourous', *parni-ma* 'to smell'; (*-ma* is a transivitizer – Austin 1992); Arrernte *ntyeme* '(intr) to give off odour', *ntye-rne-me* '(tr) to smell; to sniff'; Yinyjiparnti *parnti-* 'smell/give off odour', *parnti-ku* 'smell/detect odour of'. Finally, there are languages with an equipollent opposition between the two perception verbs: for example, Pitjantjara *parnti* 'scent, odour', *parntinyi* 'give off a smell, scent', *parntini* 'smell, sniff'.

A second etymon, reconstructable as **numa-* (with laminalization to initial *ny* or *nh* in Pama-Nyungan - see Evans 1988) and probably going back to a deeper level given the existence of more widespread non-PN cognates, appears to have originally meant 'smell' in the transitive sense and to have evolved in the opposite direction; shifts to the source meaning are only found in the Yolngu subgroup of Pama-Nyungan languages.

NonPN:
Maran: Warndarang *nyung* 'smell something'
Arafuran: Burarra *numa* 'smell something'
Gunwinyguan: Jawoyn *noma-* 'smell something', Mayali *nome-* 'smell$_{1/2}$',
Mangarayi *numa-* 'smell (transitive)'

PN:
Yolngu subgroup: Dätiwuy *nyungayun* 'to smell something', Gupapuyngu *nhuman* 'smell, sniff around, give off a nice or nasty smell', Djinang *nyumiki* 'give off an odour; stink; smell an odour'
Wik-Mungkan *nhuumaN* 'avoidance smell',
Wik-Ngathan *nhumey* (n.) 'smell, body odour'
Djabugay *nyungka-l* 'smell (tr.)'
Yidiny *nyunja-l* 'kiss'; Yidiny Jalnguy *nyungka-R* 'smell'
Umpila: *nhu:ngka* 'smell (tr.)'
Guugu Yimidhirr *nyu:mal* 'smell, sniff'
Gugu Yalanji *nyu:mal* 'smell, taste'
> Wemba-Wemba *nyumila* 'to think', prob < 'smell'

In a few languages the experiencer-based and source-based senses of 'smell' have a more symmetrical relation, with the same formative incorporated into or compounded with different verb roots. In Warlpiri, for example, we have the pair *parnti-nyanyi* 'to smell something', and *parnti-mi* 'to smell; to stink; to emit an odour', and in Walmajarri the pair *parnti-nyu* 'smell' , as in *wulyu pa parntilany pujungun* 'newly fallen rain smells good', and *parntimanu* 'smell', as in *parntimanany parlipa warlu manyjirnujangka jirrjingu* 'our noses smell a fire burning'. Note also Watjarri *parntimanja* 'produce smell, scent', *parntingamanja* 'smell (something)'. In several Gunwinyguan languages there is an opposed pair in which the activity verb incorporates a root meaning 'smell' into 'see', while the source verb incorporates the same root into the intransitive verbalizer: an example is Dalabon *bobna* [smell-see] 'smell, perceive by smell', *bobmu* 'smell, emit an odour', and further examples will be given below. Even in these languages, however, the olfactory modality is the only one to allow such a balanced construction, and the

symmetry is not complete either since the verb root with the activity sense is semantically more specific (deriving from 'see') than the root with the source-emission sense.

So, in contrast to the other four senses, 'smell' is the only one which as a source-based verb typically takes the source as subject in Australian languages, and a large number of Australian languages lexically distinguish source-based 'smell$_3$' from experiencer based 'smell$_{1/2}$'.

4.1.2.4 Use of nominal for source

A final strategy for encoding a source-based event type is to use a nominal naming the source, rather than a verbal construction. Kayardild uses this construction with 'taste', as in:

(26a) *danda* *mirra-a* *bid-a* *wuran-d*
K this-NOM good-NOM taste-NOM food-NOM
'this food tastes good'

(26b) *dan-da* *birdi-ya* *bid-a* *wuran-d*
K this-NOM bad-NOM taste-NOM food-NOM
'this food tastes bad'

4.1.2.5 Representational types: summary

Figure 7 summarizes the constructions used in Arrernte and Kayardild for Viberg's fifteen cells. As it shows, controlled perception verbs are not differentiated lexically from the non-controlled ones except occasionally with 'smell', as in Kayardild. Source-based 'smell' tends to be lexically distinguished from activity and experience, and also tends to have source as subject. For the other four sensory modalities, the source constructions most commonly employ the same verb as is found in activity and experience uses, either with an overt or covert perceiver and a second predicate on the object ('O.PRED') corresponding to the subject complement expressed in English, or in a periphrastic (biclausal) structure (as is the case for Arrernte 'hearing' and 'taste'). In Kayardild, the expression of source-based 'taste' is not done with a verbal predicate, but uses a nominal naming the source.

	Activity (Controlled)	Experience (non-controlled)	Source-based
sight	look at A: <S> *are-* <O> K: <S> *kurrija* <O>	see A: <S> *are-* <O> K: <S> *kurrija* <O>	look (S.COMP) A: (<S>) *are-* <O> <O.PRED> K: <S> *kurrija* <O> <O.PRED>
hearing	listen to A: <S>*awe-* <O> K: <S> *marrija* <O>	hear A: <S>*awe-* <O> K:<S> *marrija* <O>	sound (S.COMP) A: [periphrastic, dependent clause contains *awe-*] K: <S> *marrija* <O> <O.PRED>
touch	$feel_1$ A: <S> *anpe-* <O> K: <S> *karrmatha* 'hold, grasp' <O>	$feel_2$ A: <S> *anpe-* <O> K: <S> *karrmatha* <O>	$feel_3$ (S.COMP) A: [periphrastic, dependent clause contains *anpe-*] K: <S> *karrmatha* <O> <O.PRED>
taste	$taste_1$ A: <S> *arrkerne-* <O> K: <S> *kamaja* <O>	$taste_2$ A: <S> *arrkerne-* <O> K: <S> *kamaja* <O>	$taste_3$ (S.COMP) A: (<S>) *are-* <O> <O.PRED> K: <S> ADJ *bida*
smell	$smell_1$ A: <S> *antyerne-* <O> K:<S> *bamatha* <O>	$smell_2$ A: <S> *antyerne-* <O> K: <S>*ba(r)ndija* <O>, <S> *banjija* <O>	$smell_3$ (S.COMP) MpA: <S> *antye-* K: <S> ADJ-*banjinda*

Fig. 7: Viberg grid for Mparntwe Arrernte and Kayardild

On the basis of his research, Viberg (1984:135) observed that "most languages use fewer than 15 verbs to cover the 15 meanings of the basic paradigm". However, the Australian languages appear to be fairly radical in their degree of lexical conflation. In Arrernte, only 6 distinct verbs are used. Kayardild, which appears to be unusual in the Australian context in having three distinct verbs for the sensory modality of 'smell', only has 7 distinct verbs (and a non-verbal way of dealing with $taste_3$). The only sensory domain where a large number of Australian language have more than one lexical verb is 'smell'. Given the typically 'derived' nature of the source-based set, and the lack of consistent differences between the sets denoting controlled vs non-controlled perception, we will henceforth restrict ourselves to considering just the five basic perception verbs. We now turn to the question of semantic extensions across modalities.

4.2 Semantic extensions across sensory modalities

On the basis of his survey of more than 50 languages, Viberg (1984:136) sets up the following simplified modality hierarchy based on attested semantic extensions and polysemies across sensory modalities in the domain of perception verbs:

sight > hearing > touch > { smell / taste }

Figure 8 : Viberg's (simplified) modality hierarchy

Essentially the hierarchy indicates that a verb originally referring to 'sight' can extend its meaning to refer to 'hearing', and a verb originally referring to 'hearing' can extend its meaning to refer to 'touch' and so on. The pattern of extension is, however, unidirectional. A verb originally referring to 'touch' never extends to cover 'hearing', and a verb originally referring to 'hearing' never extends to cover 'sight'. The above hierarchy obscures the fact that patterns of extension do not always operate contiguously. While shifts always preserve the pattern of extension from 'higher' modality to 'lower' modality in the domain of perception verbs, the extensions may skip certain intermediate modalities. Viberg (1984:147) presents the complete network of attested shifts in a refined version of the hierarchy (Figure 9).

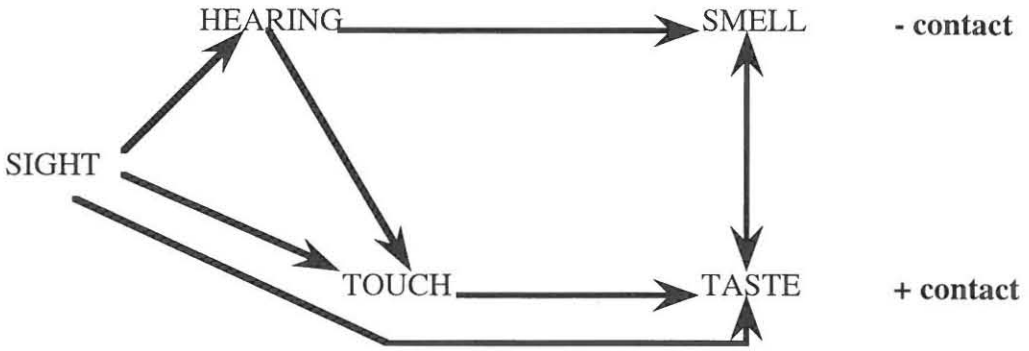

Figure 9: Viberg's refinement of the modality hierarchy for polysemy in perception verbs

Before examining how far the Australian data supports this analysis, we need to distinguish two types of semantic extension that we will be using as evidence: direct and indirect.

Direct extensions, which involve polysemy proper, extend from one sensory modality to another with no formal marking of the difference, as with:

Yir Yoront	*karr*	'see, look at; hear, listen'
Gugu Yalanji	*nyajil*	'to see, hear, perceive'
Guugu Yimidhirr	*nhaamaa*	'see, look at, hear; think'
Mayali	*bekkan*	'hear, listen to; feel'

In such cases, we rely on comparative and historical work to determine the direction of shift. For example, as we showed in §3, the 'see' verb reconstructable for proto-Australian is **na*, with development to **NHaa* in proto-Pama-Nyungan, and this is the form that gives rise to the Gugu Yalanji and Guugu Yimidhirr forms above; thus confirming the extension of 'see' to cover 'hear' in those languages.

On the other hand, extensions may be indirect, requiring some overt marking. As noted in our methodological discussion in §3, this is a matter of heterosemy rather than polysemy proper. Typically this involves the adjunction or incorporation of a noun designating either the body part used, e.g. 'ear see' for 'hear', or the source, e.g. 'taste see' for 'taste', 'smell see' for 'smell', as in the Djabugay and Mayali examples below; there is a tendency for the organ to be designated with the sense modalities that are higher on the hierarchy, and the stimulus with those that are lower on the hierarchy as in the Kurtjar set. Sometimes the meaning of the extra element is not known, or is not distinguishable from the whole complex, as with Warlpiri preverb *purda-* in *purda-nyanyi* 'hear, listen etc.'

Djabugay	*ngundal*	'see, watch, look at'
	bina ngundal	'hear, listen' [bina: ear]
Mayali	*bekkan*	'hear, listen; feel'
	manjbekkan	'taste' (lit. 'taste-hear')
	kukbekkan	'touch' (lit. 'body-hear')

Kurtjar	*ak*	'perceive; (esp.) see; find out; (also) meet, hear, smell'
	rdengkarr.ingk ak	'hear' [ear-ergative/locative see/perceive/hear]
	oongk ak	'smell' [odor see/perceive/hear]
Warlpiri	*nyanyi*	'see, look at'
	purda-nyanyi	'hear, listen [etc.]
	parnti-nyani	'smell (trans.)'

As noted in §3, we include evidence from both direct and indirect extensions, for the following reasons:

> (a) the patterns tend to be parallel - our evidence will show that what one language does by direct extension another will do by derivation.
>
> (b) the difference is sometimes rather arbitrary, since in many languages the sense-specific noun will frequently be omitted, but is available should clarity be required. An example of this is Yir-Yoront where *karr* is listed with the meanings '1. see, look at, watch. 2. hear, listen'; the second has the synonym *pin-karr* 'ear-see' but the first has no synonym.
>
> (c) in some sense the cross-modal extension has already been made if we are to interpret the collocation, e.g. 'see a smell'.

We now proceed to examine the attested extensions one by one, working downward through the sensorium.

4.2.1 Extensions of 'see' to other sense modalities

Extensions of 'sight' to 'hearing', both direct and indirect, have been exemplified from seven Australian languages in the preceding section. Of these seven, five languages — Yir Yoront, Gugu Yalanji, Guugu Yimithirr, Djabugay, and Kurtjar — are all from the region around the southern half of Cape York, which suggests that the extension of 'sight' to 'hearing' could be an areal phenomenon in that part of Australia.

Other examples of the shift of 'sight' to 'hearing', outside of the Cape York region, include, Jaru, Ngaliwurru and, perhaps, Wardaman. Along with Warlpiri, these languages are part of a north-western areal block, characterised by having a small, well-defined set of mono-morphemic verb roots. In this case, extension correlates with the fact that there is a reduced set of lexicalised distinctions in the verb class.[22] For Jaru, Tsunoda (1981) notes how under most conditions a verb compound (VC) involving the verb 'to see' is used to render the notion 'hear, listen', while in the imperative the 'see' verb on its own is used in the sense of 'listen'. The relevant form, *nyang-* 'see; look' is clearly a descendent of the Australian proto-verb for 'to see' mentioned earlier, and Tsunoda writes (1981:184):

---

[22] It is well-known that there is a linguistic area in the north-west part of Australia in which languages have small closed class sets of monomorphemic verb roots (see, for instance, Dixon 1980). This area cross-cuts the distinction between Pama-Nyungan and Non-Pama-Nyungan. Among the Pama-Nyungan languages, for example, Warlpiri has only 120 verb roots, Warumungu 53, Warlmanpa 43, and Walmajarri and Djaru have about 40. Among the Non-Pama-Nyungan languages, Wardaman has about 130 (with 8 used with a very high frequency), Wagiman has 45, Jaminjung about 30, and "some languages of the Kimberleys and the Daly River area have only about a dozen roots to which can be added verbal inflections" (Dixon 1980:280). In all the instances we have examined of languages with limited sets of verbs, if a language has a perception verb, it will be 'see'. There is no language with a 'hear' verb that does not have a 'see' verb. As we have seen in Warlpiri and Djaru, 'hear; listen' is often derived by virtue of a preverb added to the verb 'to see'. However, the verb for 'hearing' is also often derived on the basis of an addition the verb for 'take' or 'do' (e.g. Walmajarri).

> Djaru has very few verbs — only about 40 ... But, Djaru has more than 290 preverbs and in many cases what is expressed by a single verb in Djirbal is expressed by a VC of a preverb and verb in Djaru, even basic notions such as 'hear/listen to' — *bura nyang-* Vtr 'hear/listen to' (*bura* preverb 'listening', *nyang-* Vtr 'see/look at') ... But, at least in the imperative, i.e. *nyang-ga*, this verb alone (without the preverb *bura* 'listening') can mean 'listen'. The writer heard this on many occasions. ... It appears that when *nyang-ga* 'see'-IMP is used in the sense of 'listen', the sentence consists of just this word and no other words (e.g. subject, object) at all. This 'marked' use of the verb 'see' is syntactically extremely limited.

In Ngaliwurru (Schultze-Berndt p.c.), a language with only about 30 verb roots, there is a simple verb for 'to hear', *-malangawoo*, but this is almost certainly based historically on *-ngawoo* the verb 'to see'.[23] Finally, with respect to Warndarang, Merlan (1994:174) speculates that:

> The few verbs which end suggestively, for the purposes of historical analysis, in *-rna* are: *jomarna-* 'to finish off', *ledbarna-* 'see'. and *wojbarna-* 'listen' this may be relatable to *na-* 'see'.

The extension of 'sight' to 'smell' has also been exemplified in the previous section for Kurtjar and Warlpiri ; an example with a noun meaning 'smell' incorporated into the verb is from Dalabon; as the four forms below illustrate, 'hear' is likewise derived from 'see' by incorporation,[24] and both 'see' and 'hear' may then transfer to 'smell' (see §4.2.2 for extension of 'hear' to smell in Dalabon):

Dalabon	*nan*	'see, look at'
	wo-nan	'hear, listen to [etc.]'
	bob-nan	'smell (tr.)'
	dolng-wo-nan	'smell smoke'

(27)	*manjh*	*kah-bob-mu*	*ngah-bob-na-n*
D	meat	3-smell-INCH-NP	1/3-smell-see-NP
	'I can smell the meat.' (lit. 'the meat smells, I smell it')		

'See' is not attested with extensions, whether direct or indirect, to the senses involving direct contact: touching and tasting.

4.2.2 Extensions from 'hear' to other sense modalities

'Hearing' is attested with extensions to all three lower senses. In Mayali *bekkan* 'hear, listen' can extend to 'feel by touch' without formal marking, as in (28), or it may incorporate the noun *kuk* 'body, physical presence' to give *kukbekkan*, which can only mean 'feel (by touch)'.

(28)	*La*	*ø-wurlebmeng*	*ø-yawam*	*ku-rrulkdulk-kah*
I	and	3P-swam	3P-searched	LOC-REDUP-tree-LOC

ø-ngimeng	*kanjdji*	*wurrno-kah ,*	*ø-yawam*
3P-entered	inside	hollow.log-LOC	3P-searched

kure	*ø-wurlebmeng*	*kun-kudji*	***ø-bekkang***	***ø-karrmeng,***
LOC	3P-swam	IV-one	3P-heard	3/3P-grabbed

[23] In Jaminjung, Ngaliwurru's closest relative, the verb for 'see' is *-ngawoo,* but 'hear; listen' is an extended meaning of the verb *-ooga*, which is glossed as 'TAKE'.

[24] The etymology of *wo-* is unknown. Unlike *bob* 'smell' and *dolng* 'smoke' it is not a productive incorporating noun, but comparison with roots in neighbouring languages (e.g. Mayali *-wok* 'language') suggests it may have originally meant 'words, language'.

ø-bekkang ***ø-karrmeng.***
3/3P-felt 3/3P-grabbed

'Again he went down and searched for it, this time feeling inside a hollow log in the water, he searched around under the water and he felt it and grabbed it. ..'

In Warlpiri *purda-nyanyi* 'hear, listen to' (itself extended from *nyanyi* 'see' by preverb) will have a 'feel (proprioceptively)' reading when used reflexively with a complement of evaluation (Laughren 1992:222). For 'feel by touch' another verb (e.g. *marnpirni* 'feel with hand') will be used.

(29) *wati-ngki ka-nyanu purda-nya-nyi murrumurru*
W man-ERG PRES-REFL hear-perceive-NP sore:ABS
'The man is feeling sore.' (lit. 'the man hears himself (to be) sore').

Similarly, in Yidiny, *binangaaaji-N*, the reflexive form of *binanga-L* 'hear, listen to', "has the metaphorical meaning 'feel oneself', literally 'listen to oneself, to see how one is' (Dixon 1991:103). As noted earlier, Arrernte *welhe-* 'feel (proprioceptively)' is also originally derived from *awe-* 'hear; listen' plus the reflexive suffix *-lhe*. In Pitjantjatjara, one of the senses of *kulini* 'hear; listen', without reflexive, is 'feel a bodily sensation' (as in 'When he wants to go to the toilet, he feels a burning sensation').

'Hear' also occasionally extends to 'smell'. In Dalabon, as we have seen, the generic verb for 'smell' is derived by incorporating a noun 'smell' into 'see', whereas 'smell smoke' is literally 'smoke-hear'; an example is:

(30) *ngah-dolng-wonan ngah-mey, mey kah-kíkinj George,*
D 1/3-smoke-hearNP 1/3-picked.up food 3/3-cookNP

njelng, yalah-ngu-yan-kvn.
for.us we-eat-F-GEN
'I can smell that smoke coming up now from George cooking dinner for us, so that we will eat.'

In Mayali, the verb for 'taste' is *manjbekkan*, which incorporates the noun root *manj* 'taste'; however, since *bekkan* can mean either 'hear' or 'feel by touch' we cannot be sure whether this is an extension of 'hear' or 'feel by touch'. Note also the following example, in which *bekkan* is used with a second predicate on the object-source in a source/judgment construction with a 'taste' meaning (lit. they tasted it foul); it is not clear whether this extension is possible outside the source construction.

(31) *birri-bo-nang njamed birri-doy djidjerok birri-bonguneng*
M:I they-water-saw whatsit they/it-struck melaleuca they-drank

birri-bekkang na-bang and birri-wam wanjh.
they/it-heard MA-'cheeky' they-went then

[Here they lived thirsty (at one time). They ate (only) honey.] 'They went and got water out of the Melaleuca trees but it tasted foul and so they kept going.'

4.2.3 Extensions of 'smell'

'Smell' occasionally extends to 'taste'. Kayardild *banyji-ja*, discussed in §3.1.2.3 above, basically means '1. smell (intr.) 2. smell (tr.)' but in a coverbal construction with the verb 'eat' can mean 'taste':

(32)	*banyji-ja*	*diyaja*	*ngada*	*barrngkay*
K	smell-ACT	eat-ACT	1sgNOM	lily root-OBJ
	I tasted the lily roots.			

Worms (1942:124) mentions extension from 'smell' to 'taste' in Bardi, attributing the extension to the noun *nyaar*, but since his example involves a sentence it may also be interpreted as polysemy of the preverb plus verb combination *nyaar i-nen* 'it smells/tastes'.

In Gugu Yalanji *nyumal* means 'smell or taste (trv.)'; comparative evidence points to an original 'smell' meaning for this verb - see §4.1.2.3.

There are no examples of 'taste' extending to 'smell'.

4.2.4 'Taste' and 'touch'

In §4.2.2 we discussed a Mayali indirect extension of 'hearing' to 'taste', which we acknowledged could possibly be interpreted as an extension of 'feel by touch' to 'taste', given the fact that the base verb was polysemous between 'hear' and 'feel by touch'. Otherwise, verbs for 'taste' and 'touch' are not attested with extensions to other sensory modalities. Indeed, these verbs are often only marginally lexicalized in Australian languages, so that 'taste' is often a sense of 'try', and 'touch' is often a sense of 'grasp' or 'hold'.

Examples of languages in which 'try' and 'taste' are rendered by the same verb are numerous.

Ungarinyin	*argu*	'to try, to taste'
Alyawarra	*arrkerneyel*	'1. try something out 2. taste something',
Kukatja	*yarrkala*	'1. taste 2. try'
Yidiny	*banja-L*	'try (to do), test, taste'
Guugu Yimithirr	*baadal*	'try, taste',

The fact that a verb meaning 'try' in the context of food and eating will be interpreted (via this particular bridging context) as meaning 'taste' is not unusual and is attested in many languages of the world. Dixon (1991) presents Yidiny examples of *banja-L*, in the sense of 'taste', which have that meaning only in combination with 'eat' and which he explains as meaning literally 'try eat'. This seems parallel to the Kayardild example in the previous section where 'smell eat' is used to mean 'taste'. Other languages have 'taste' as an extension of 'bite', e.g. Lardil *betha* 'to bite; to taste, have a taste of, eat a sample of'. Similarly, Warlpiri *paja-rni* 'to taste; savour' is almost certainly descended from an original proto-Pama-Nyungan verb **paja-* 'to bite; chew' (cf. O'Grady 1990:220).

In Ngiyampaa (Donaldson 1994; 1980), both 'taste' and 'feel' are complex forms premised on the notion of 'testing' (or 'trying') with a certain bodypart: *nga-thali* 'taste', literally 'test-with mouth', and *nga-mali* 'to feel', literally 'test-with hand'. Although there is often evidence that 'try' is the primary meaning of a verb, and 'taste' a secondary meaning, in some cases, e.g. Ngalakan *many-ngu* 'taste, test' the etymology shows the 'taste' meaning to be original (the form is identical to Mayali *manj-ngu* discussed above).

Kayardild is an example of a language where the verb for 'grasp' or 'hold', *karrmatha*, is extended to mean 'feel, touch' (see §4.1.2.1 and §4.1.2.5).

4.2.5 Overview

Figure 10 summarizes the Australian findings. As in Viberg's study, 'sight' is at the top of the modality hierarchy. In the Australian data, it extends to the other 'non-contact' modalities 'hearing' or 'smell', but no other basic perception verb extends to 'see'. 'Hearing' is next; unlike 'see' it also extends down to all other modalities, including the two 'contact' modalities ('touch' and 'taste'). As discussed earlier, a number of Australian languages have a sixth perception verb, 'feel (proprioceptive)', which is commonly expressed as the reflexive of 'hear'. 'Smell' extends to 'taste' but to nothing else. Depending on the interpretation of one Mayali example, there could be a case for an extension of 'touch' to 'taste'. Thus, if we consider just the five basic modalities (excluding 'feel proprioceptive'), then a comparison of Figure 10 and Figure 9 shows that the only extension in the Australian data that is not included in Viberg's figure is that of 'sight' to 'smell'. Conversely, the only extensions in Viberg's data that are not attested in the Australian data are 'sight' to 'taste' and 'taste' to 'smell'. Such differences, however, are minor and do not in anyway reorganize the modality hierarchy as proposed by Viberg.

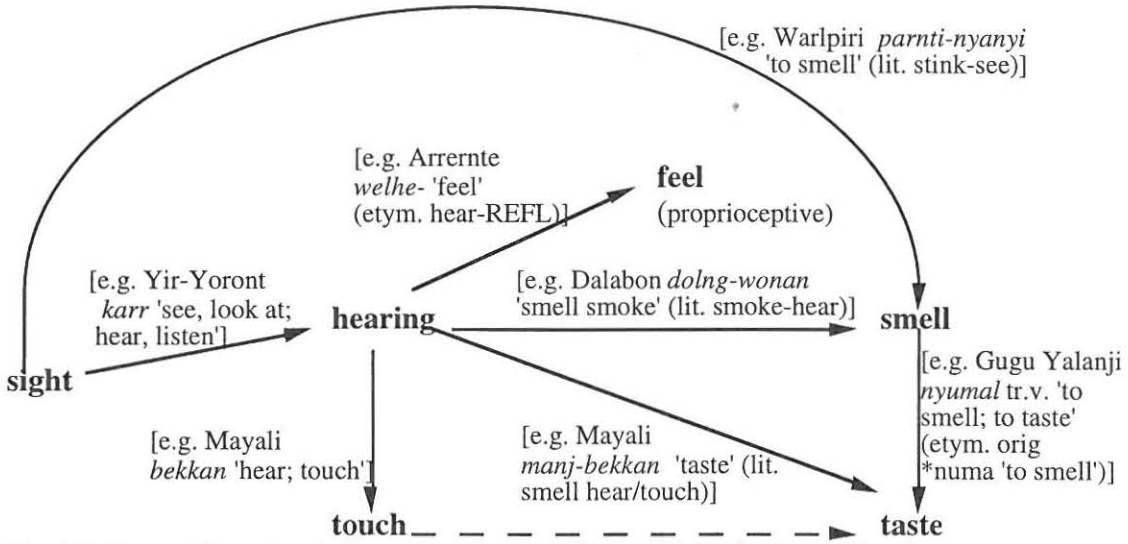

Fig. 10: Semantic extensions across perceptual modalities in Australian languages

It is probably useful to remind the reader that some of the shifts appear to be attested primarily in specific regions of Australia. Thus, the shift of 'sight' to 'hearing' is particularly common in the southern half of Cape York, and in the north-western region in which languages have small sets of monomorphemic verb roots.

There is an interesting correlation between the directionality of shifts, uniformly from the 'higher' to the 'lower' senses, and the relative salience of perceiver and stimulus in the linguistic treatment of the different senses.[25] [26]

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[25] An interesting cryptotypic manifestation of this in English is the difference in interpretation of certain locational adjuncts. Compare 'I saw him from behind the rock', where 'behind the rock' can only modify the subject, with 'I smelt him from behind the rock', which is ambiguous between subject-modifying and object-modifying readings.

[26] This skewing of salience is one likely reason for the near-converse relation between extensions of sense verb downwards, and synaesthetic extensions upwards (Williams 1976), e.g. from 'sharp to the touch' to 'sharp note': perception verbs basically recruit from actions of perceivers, while synaesthetic adjectives recruit from properties of the stimulus. However, the converse relationship is not perfect, since on Williams' schema 'touch' transfers to 'smell' as well as to 'color' and 'sound'. Unfortunately we have very little data on synaesthetic adjectives in Australian languages and do not pursue this question further here. Viberg (1984:158-160) discusses the relation of his findings to findings about synaesthesic relations and also discusses the significance of reverse patterning. Note that some earlier treatments of perception verbs (e.g. Bechtel 1879) emphasized the parallelism between the senses in terms of stimulus as an etymological source for all five modalities.

We have already seen the unusual behaviour of 'smell' verbs, the only widely lexicalized lower-sense verb in Australian languages: they are the only verbs in the whole sensory lexicon which undergo an argument-structure shift between source-subject and perceiver-subject. Moreover, it is only in the modality of 'smell' where Australian languages commonly lexicalize the distinction between the source-based event type and the experiencer-based (activity and experience) event type. But there are other manifestations of this difference in salience of perceiver and stimulus.

Thus the higher senses, if they need to be specified in a language like Kurtjar with a more abstract 'perceive' verb, do so by means of an involved body part, e.g. *rdengkarr.ingk a.k* 'see/perceive with the ears' for 'hear'. On the other hand the lower senses are usually specified in terms of the source: (*oongk*) *a.k* 'see an odour' in Kurtjar, 'body-hear' for 'touch' and 'taste-hear' for 'taste' in Mayali. Kurtjar, however, retains the possibility of specifying 'smelling' in terms of the organ, especially when discussing animals: (*wongk*) *a.k* 'smell (with the nose, especially for animals)' (Black & Gilbert 1986:1).

We see the same skewing when we consider etymologies of perception verbs. In Kayardild, for example, the higher verbs appear to be old compounds of a body part with a stance verb *-di -ja~ -rri -ja~ -ji -ja* , originally 'stand': *kurrija* 'see' based on *kuwa* 'eye', i.e. 'eye-stand', *marrija* 'hear' based on *marral-* 'ear', i.e. 'ear-stand'. But *banjija* 'smell' appears to be derived from the perceptual source: an old root *bany-* 'stink (n.)' with *ji-ja*, i.e. 'stink-stand'.

Overall, then, the fact that our findings with regard to semantic extensions in the domain of perception verbs correlate so closely with Viberg's supports the idea of a degree of universalism as far as the lexicalisation of perception verbs is concerned.

The only people who would be surprised by these findings are the "anthropologists of the senses". Classen (1993) in discussing the ranking of the senses in a historical perspective, scoffs at Western hubris in ranking 'sight' in the highest position followed by 'hearing'. She argues (1993:7) that "[s]ensory orders are not static entities, they change over time just as cultures themselves do". But we have seen that, at least in the realm of perception verbs and their semantic shifts, a rank order does hold, both across cultures and across time (since it is derived from diachronic perspective), and it is very close to "the standard ranking" she suggests is merely a Western cultural product. Classen (1993:5) writes:

> When almost every other aspect of human bodily existence — from the way we eat to the way we dress — is now recognized as subject to social conditioning, it is surprising that we should still imagine that the senses are left to nature.

But why shouldn't the senses, at least in some small part, be left to nature. A radical relativism that attempts to deny any universal bases for human experience must argue its case from empirical evidence, on a case by case basis. There is no reason to assume that relativity in one domain of human experience argues against universality in another domain, as Classen seems to imply. In discussing the cross-linguistic uniformities in ethnobiological (taxonomic) classification, Berlin (1992) speaks of "perceptual givens that are largely immune from the variable cultural determinants found in other areas of human experience". He writes:

> Human beings everywhere are constrained in essentially the same ways — by nature's basic plan —in their conceptual recognition of the biological diversity of their natural environments. In contrast, social organization, ritual, religious beliefs, notions of beauty — perhaps most of the aspects of social and cultural reality that anthropologists have devoted their lives to studying — are constructed by human societies.

The perception verb data, then, suggests that within the domain of perception verbs "nature's basic plan" may be a stronger force than cultural conditioning when it comes to lexicalisation patterns and directionality of semantic shifts. Whether this is also true for

trans-field metaphorical shifts from the domain of perception to that of cognition will be explored in the following section.

5 Trans-field mapping of perception onto cognition

In the last section we saw that the pattern of extension within the semantic field of perception verbs is basically as predicted by Viberg, and confirms the primacy of vision as the source for semantic extensions to other modalities. We now turn to trans-field semantic extensions from the sensory to the cognitive domain, and here we will find a radical departure from the Indo-European pattern. We will demonstrate that in Australian languages it is 'hear' rather than 'see' which regularly maps into a large set of cognitive verbs, including 'knowing', 'remembering' and 'thinking' as well as the more familiar 'understanding' and 'heeding'. 'See' only rarely extends into the cognitive domain (usually via 'recognizing visually', thence sometimes to 'know (esp. by sight)'), and more commonly denotes interpersonal emotion and communication such as 'meet with', 'look upon with desire', 'choose' etc. 'Smell' , 'taste' and 'feel' also have limited sets of extensions into the cognitive domain.

In this section we first examine the way in which syntactic frames can be used to distinguish cognitive and perceptual senses of such verbs, at least in some languages; this is relevant to the question of whether we are dealing with a clear distinction between perceptual and cognitive senses in the languages in question. Then we anticipate the lines of development of 'hear' and 'see' by examining the semantic extensions of the associated body-parts, 'ear' and 'eye' in a typical language, Kayardild. From there we pass through semantic extensions of the verbs themselves, starting with 'hear' and moving on to 'see', 'smell', 'taste' and 'touch'. We conclude by summarizing the overall pattern of mappings from sensory modalities into cognition and emotion, and discussing the extent to which there is a recognizable geographical patterning.

5.1 Distinguishing perception and cognition senses of polysemous verbs

In a language with a single verb for 'hear' and 'think' (or 'see' and 'think', for that matter), it is not immediately obvious that we are dealing with two distinct senses, since we could be dealing either with an entire semantic system that does not systematically distinguish perception from cognition, or at least with some verbs that abstract away from the difference, with the result that we have a vague rather than a polysemous meaning. For instance, Pawley (1994), discussing the verb *nŋ* in the Papuan language Kalam, claims it has a unitary meaning which merges perception and cognition. He writes (1994:392) that *nŋ* is:

> a mental predicate with a meaning more general than KNOW, THINK or FEEL... which denotes awareness, conscious perceiving, that is both sensing and cognising, in which the perceiver is (at least partly) in control, or at least is a wilful actor. In different contexts *nN*, occurring as the lone content verb in a clause, may be glossed as 'know, be conscious, be aware, be awake, think, see, hear, smell, taste, feel, recognise, notice, understand, remember, learn, study'.

Pawley (1994:393) goes on to point out that *nŋ* "also occurs, accompanied by nouns or adjuncts or other verb stems, in a number of lexicalised phrases that translate specific English verbs of awareness." - Thus, 'feel by touching' is 'touch *nŋ* ', 'taste' is 'eat *nŋ* ', 'see' is 'eye *nŋ* ', 'hear' is 'ear *nŋ*, and so on. In discussing Pawley's paper, Wierzbicka (1994:455-6) dismisses his claim that *nŋ* has a single unified meaning on the grounds that

he fails to say what the supposedly unitary meaning is.[27] We do not regard this as a clear rebuttal of Pawley's position, since he could equally borrow a Wierzbickan argument and claim that he has only "failed" to provide a unitary meaning because *nŋ* is an undefinable semantic primitive in Kalam. Still, one would like to see more formal evidence to substantiate one or the other position, and in this section we review some of the structural clues which can be used for distinguishing the distinct senses of a polysemous verb.

For the Australian language Pitjantjatjara, Bain (1979:126) similarly claims a lack of distinction between perception and cognition senses of a basic verb:

> there is no way to differentiate the concepts of thinking, listening and heeding in Pitjantjatjara. The same verb *kulini* does duty for all.

In this case, however, there is clear evidence that we are dealing with distinct senses. In response to Bain's claim about Pitjantjatjara, Goddard (1994: 237), has pointed out that the three senses of *kulini* have different syntactic frames: "Only the THINK sense can take a 'quasi-quotational' clausal complement (often introduced by alatji 'like this')", "[o]nly the 'hear, listen' sense can take a non-finite circumstantial complement", and "[o]nly the 'heed' sense can take a locative case complement." These three distinct syntactic frames for *kulini* are exemplified in (33), (34) and (35), respectively.

(33) *Ngayulu* *alatji* *kulini,* *"tjinguṟu-la..."*
P I like.this think:PRES maybe-we
'I think this about it, "maybe we..."'

(34) *Ngayulu* *aṉangu-ngku* *wangkanytjala* *kulinu*
P I people-ERG talk:NOMZR:LOC hear:PAST
'I heard people talking.'

(35) *Wati katjangku* *mamangka* *kulintja* *wiya*
P man son:ERG father:LOC heed:NOMZR no
'The son won't heed his father.'

Thus, if we can find different syntactic possibilities associated with distinct readings of a verb, — for instance, if we find that each sense has its own corresponding case frame and its own distinct set of entailments — then a reasonable case can be made for polysemy.[28]

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[27] Wierzbicka (1994:455-6) writes that Pawley: 'insists that the meaning of *nŋ* is unitary (in the name of the general methodological principle that "semanticists and lexicographers should first seek a unitary meaning for a word".., but again, he doesn't say what this supposedly unitary meaning is.'

[28] The trick here, however, is to make sure that there isn't a good argument for saying that a particular 'sense' is not simply a function of a more general meaning of the verb in composition with the meaning that can be attributed to the morpho-syntactic frame. There is widespread disagreement on how to treat this problem, ranging from those who take different combinatorics as evidence for polysemy, to those who say the different combinatorics induce the meaning differences and that polysemy can only be established when two senses are possible in the same syntactic environment. Our stand falls between these positions: where the difference in meaning can be explained as a result of the syntactic environment, and exhibits parallels across a number of comparable lexemes plugged into the same range of frames, we take these to be simply contextual variants, whereas when the difference can only be arbitrarily related to the syntactic frame, or is limited to a single lexeme, we treat them as lexically different senses. For example, the fact that all sense verbs in Kayardild will get a controlled reading when they occur with an imperative, and that this can be derived from the logical need for an activity to be controlled if one is to order someone to carry it out, is an argument that these are merely contextual senses. On the other hand, the fact that only 'hear' projects an 'understand' meaning in Kayardild, even though 'see' is perfectly compatible with semantic extensions to 'understand' in other languages (see e.g. Alm-Arvius 1993 on English 'see') suggests this sense is lexicalized. In the Pitjantjatjara/Yankunytjatjara case being considered here, there is no semantic reason why *alatji* 'like this' should not take a complement of hearing ('I heard like this, the following:...'); to the extent that such combinatorial characteristics are arbitrary, a polysemy analysis is favoured.

In Warlpiri (Laughren 1992:223) "it is significant that when a perception verb selects a 'state of affairs' rather than an 'individual' as its object of perception, it can assume a range of meanings which diverge somewhat from the prototypical sensory perception meaning the verb has when selecting an 'individual' as its object of perception. This tendency is evident from the accompanying English translations" in (36-7), in both of which the element of evaluation present in the small clauses *turaki .. maju* '(the) truck .. bad' and *pirrjirdilki ... yapa* 'the person .. strong' bleeds back into the perception verb, requiring a translation as 'see that, consider that' or 'feel that' rather than simply 'see' or 'feel'.

(36) W
Turaki nyampu ka-rna nya-nyi maju.
vehicle this:ABS PRES-1sgSUBJ see-NP bad:ABS
'I see/think/consider/feel/reckon (that) this car (is) no good.'

(37) W
Pirrjirdi-lki marnpu-rnu yapa ngangkayi-rli
firm:ABS-CS feel.with.hand-PAST person:ABS medicine.man-ERG
'The medicine-man felt the person to be strong.'
(as when he touches a sick person's stomach and finds it feels firm to touch.)

Related to the above is the fact that verbs are often used without an overt object when they have a cognitive meaning. In Pitjantjatjara, for example, *kuli-* will frequently be used with no overt object when it means 'understand':

(38) P/Y
Ngayulu putu kulini.
I in.vain hear/understand
'I can't understand.'

Another potential formal test for showing the distinctness of perceptual and cognitive senses is repetition without tautology. In the following Arrernte sentence, for example, the verb *awe-* 'hear, listen; understand' is subordinated to itself; the subordinate verb has a cognition sense, while the imperative verb has a directed perception sense:

(39) A
[Alice Springs Traditional Owner speaking to Yipirinya School Children about the Dreamtime creation of a site that they're all visiting. His opening instruction is:]
Arrantherre anteme awe-rrirre-me-le awe-Ø-aye!
2pl.SUBJ now hear-pl-NP-SS hear-IMP-EMPH
Now you each must understandingly listen! [i.e. listen in order to extract understanding of the country and its origins]

So, differences in syntactic frame, and the possibility of self-conjunction without a sense of redundancy, provide clear evidence that distinct senses are involved. But there is a further, more semantic, type of evidence that can be used to argue against a monosemous analysis: the impossibility of formulating a semantic analysis that covers just the relevant semantic range of the form without being too narrow or too broad. Thus, a further piece of evidence against a monosemous account for 'hear/think' in most Australian languages comes from the impossibility of formulating a definition that would include 'hear' and 'think' while excluding 'see' and 'be conscious', for example. Unlike the Kalam example, where the postulated general meaning extends to the entire domain of perception and cognition, the meanings of 'hear' in Australian languages extend to only some types of perception and some types of cognition, making a monosemous analysis correspondingly harder to formulate.

5.2 Semantic derivatives of body parts

An initial view of the contrasting extensions of 'see' and 'hear' can be gained by comparing the cognitive, social and emotional extensions of 'eye' and 'ear' in Kayardild:

Eye: ***miburlda [mibur-]***	Ear: ***marralda [marral-]***
dunbuwa miburlda [extinguished eye] 'blind'	*dunbuwa marralda* [extinguished ear] 'deaf; stupid; unable to understand' *marralwarri* [ear-PRIV] 'stupid, inattentive, disobedient, unable to understand'
Visual experience: *muthaa miburlda ngada* [lit. many eye I] 'I've seen a lot' Visual acuity, esp. in the hunt: *mibur-jungarra* [eye-big] 'keen-eyed person, good hunter' Supervision and monitoring: *miburiji karrngija* [eye-remote-LOC keep] 'keep an eye on, monitor' Courting and sexual desire: *mibur-muthanda* [eye-excessive] 'lecher, "big-eye"'; *mibur-thaatha* [eye-return] 'ogle, stare at with sexual intent' Aggression: *ngarrkuwa miburlda* [strong/hard eye] 'bold; brazen; stern-faced'.	Memory: *dunbuwatha marralda* [ear become extinguished] 'forget', *marral-dunbuwatha* 'forget', *marral-durldiija* 'forget'. Understanding: *marralmirra* [ear-good] 'smart, having a good ear' Thought: *marral-marutha* [ear-put] 'think about; miss' Imagination/dreaming: *marralngulatha* 'dream about' [*marral-* is 'ear'; *ngulatha* is only attested in this word]

Fig 11: Semantic extensions of *miburlda* 'eye' and *marralda* 'ear' in Kayardild

As this example shows, 'ear' recurs in a number of phrases involving various sorts of cognition pertaining to understanding, memory and forgetting, thought and dreaming, whereas 'eye' has no cognitive extensions except to visual experience, with its non-perceptual meanings being limited to various types of social interaction: supervision and monitoring, courting, desire and choice, and aggression. 'Eye' is taken as the faculty of vision, whereas 'ear' is the faculty both of hearing and of understanding. In Tyemeri (Nick Reid p.c.) 'ear' is even polysemous to 'idea, thought', as in (40):

(40) *'ya detjeri ngerimbaty' meny ngiti*
Ty hey 'ear' I have he.said to.me
'Hey I've got an idea' he said to me.

In Walmajari the word for 'eye', *mil*, shows no apparent trans-field extensions, but there are numerous extensions of *pina* 'ear': *pina-jarti* (lit. having an ear') 'intelligent'; *pina-jularnu* (ear-tell) 'tell about'; *pina-kangu* (ear-carry) 'take and show (e.g. a place)'; *pina-l-karra* (ear-Manner.Adverb) 'remembering; keeping in mind'; *pina-ngurru* 'one who is learned, wise'; *pina-pina-karrinyu* (ear-ear-stand) 'think'; *pina-rri* 'knowing; knowledge'; *pina-yanu* (ear-go) 'go expectantly'; and *pina-yungu* (ear-give) 'show-teach'.

Similar bifurcations in the patterns of extension of 'eye' and 'ear' are widespread in Australian languages, and have been discussed so many times (Schebeck 1978, Sommer 1978, Dixon 1980:112, Seear 1995; Peile 1997) that we will not say more here. We note, however, that in many languages the words for 'see' and/or 'hear', and their corresponding social interaction and/or cognition verbs, are based on 'eye' and 'ear' (see Figure 4, in §3). In Martuthunira, for example, the noun *kuliya* 'ear' gives the verbs *kuliya-L* 'to hear', *kuliya-npa-ø* 'to think; to believe' and *kuliya-rri-ø* 'to feel; to be aware of state of health'. Consider also Jiwarli *kurlga* 'ear' next to *kurlgayi-ru* 'to hear; to listen'; *kurlganyu* 'pleased; thinking', and *kurlganyu-rri-a* 'to think; to think about'.

5.3 Extensions of 'hear/listen'

We now pass to the various extensions of the 'hear/listen' verb into the cognitive domain.

5.3.1 'Hear/listen' to 'heeding and obeying

Extensions from 'hear' or 'listen' to 'heed' or 'obey', are widely attested in Indo-European and are discussed by Sweetser (1991:43):

> '[R]eadiness to internally receive and understand implies also a readiness to subject oneself to the influence of the speaker's content - and hence perhaps a readiness to further respond in the way desired (e.g., to obey if a command is involved.).... The link between physical hearing and obeying or heeding - between physical and internal receptivity or reception - may well, in fact, be universal rather than merely Indo-European'. [Sweetser 1990:41-2]

Such extensions are indeed also common in Australian languages. We have already encountered uses of Pitjantjatjara/Yankunytjatjara *kuli-* with this sense (ex. 35). Other languages with this semantic range are Wik Mungkan *ngeeyan* 'listen, understand, hear (and obey)' and also *aak ngeeyan* 'obey, listen, understand' (*aak* 'place, home, camp, ground, country'), and Lardil *merri* 'hear, listen to; obey, pay heed to', for which a sentence example is:

(41) L
Kuba mangarda kiin, merral-kub-u. Warngelani merri danga-n.
good child that ear-good-PROP instantly hear person-OBJ
'That child is good, and obedient; he obeys people instantly.' [literally: 'That good child has good ears; (he) instantly hears people.'] (Ngakulman Kangka Leman 1997)

There are also, of course, languages with a distinct form; examples are Arrernte *akangkwirreme* 'pay attention to someone; heed; obey'; Walmajarri, where *mapunikanu* 'obey; take notice of; believe' is based on *mapun* 'true', and Burarra, where *yagurrma* has the range 'agree to, obey, give assent to'.

5.3.2 'Hear/listen' to 'Understand'

'Understand' in Indo-European languages is attested as developing into, rather than from, hear, as is the case with French *entendre*. In Hebrew, however, the verb *s-m-?* , whose basic meaning is 'hear', is frequently translated as both 'obey/listen' and 'understand'. In Australian languages unmediated extensions from 'hear/listen' to 'understand' are extremely common, and within our survey are never formally marked as derivations, although, as we shall see in later sections, derived extensions from 'hear/listen' to 'think' or 'know' may also include 'understand' in their meaning range. As examples of languages with a simple 'hear, listen, understand' range, consider Dalabon (42)[29], Kayardild (43), Arrernte (39) and Alyawarra *aweyel* 'hear, listen; understand'.

(42) D
*Wanjing yibvn yang kah-**wonan** wanjingh*
one there language 3-hear-NP one
'One boy can understand (Dalabon) language,' [cf. examples 4, 5, 6]

(43) K
Ngada marri-jarri dathin-ki kang-ki.
1sgNOM hear-NEG.ACT that-OBJ language-OBJ
'I don't understand that language.' [cf example 1]

Kriol speakers often translate the relevant verb with 'hear' or 'listen' where 'understand' is meant, particularly in the context of language. Thus in the following example Alice Bohm translated Dalabon *wonan* as 'listen to', but the context made it clear that she meant 'understand': she was discussing the need to maintain knowledge of the language by talking it to her children and grandchildren.

[29] The 'understand' meaning in Dalabon is usually associated with the unreduplicated form. As noted in §4.1.1, the reduplicated form of this same verb usually has the sense 'listen'.

(44) *kenbo bulah-woniyan bulu ngah-marne-yenjdjung-iyan yang-walvng.*
D future they/me-hearFUT they I-BEN-talk-FUT language-ABL
"I gotta talk to everybody in language and they'll listen to me." [i.e. 'then they'll be able to understand me.']

Although dictionaries of Australian languages do not always make the distinction clear, many languages distinguish between understanding language, which will be expressed by the 'hear/listen' verb, and understanding other things, which will be expressed by a distinct verb meaning 'know, understand'. In Kuninjku, for example, *bekkan* 'hear, listen to', is used when stating that someone understands language; the form *wokbekkan*, incorporating the nominal form for language, may also be used (45). On the other hand, understanding of concepts, about mythology, or food, and so on, will be expressed by *bengkan* (central and eastern dialects), whose basic meaning is 'know' (46).

(45) *Nga-wok-bekka-n.*
I I/him-language-'hear'-NP
'I understand his speech.'

(46) *Yoh, nawu kun-red ngarri-h-ni all the Aboriginal*
I yes that IV-place we-REL-sit

marrek ngarri-bengkayi bakki,
NEG we-understandIRR tobacco

or njalehnjale marrek ngarri-bengkayi kandidjdjawa and djukka,
whatever not we-understandIRR flour sugar

marrek ngarri-bengkayi.
not we-knowIRR

'All we Aboriginal people in the camp we didn't understand what tobacco was and we didn't understand sugar or flour. We didn't know.'

Despite the frequency of extensions to 'understand' from 'hear, listen' in Australian languages, there are other sources as well. In particular verbs of grasping frequently extend, as they do in Indo-European, to 'understand'. In some cases there is true polysemy, as with Djinang *marki* 'get; pick up; obtain; understand; receive'; while in other cases there is derivation (as with Djabugay *dugayi-y* 'comprehend', cf *duga-l* 'fetch, grab') or incorporation of a particular type of abstract object, as in Dalabon *yang-ma*: [language-get]:

(47) *mak bo njerr bvla-yang-mang, mak bvla-yalvng-yang-mang*
D not ? us they-language-get not they-then-language-get
'Must be they don't understand language.'

5.3.3 'Hear/listen' to 'Think'

Extensions to 'think' are less common than to 'understand', and almost invariably occur in the presence of extensions to 'understand'.[30] Most sources do not specify which meanings of 'think'are possible: 'think about/of X', 'think that X', 'think X COMP' (e.g. 'think someone good') or 'think it over/consider'. Thus, in this section, we treat what are no doubt a series of distinct extensions as if they were the same.

Many languages have verbs for 'think' with no perceptual sense (though perhaps with extensions to other types of cognition), e.g. Djapu *guyangi* (tr.) 'think that, think of',

[30] Sources on some languages do not include 'understand' as a sense of this lexeme, but give no translation equivalent for English 'understand'; Wik-Ngathan (Sutton 1995) is an example, as is Nunggubuyu *wawangki-* 'listen, pay attention, think'.

guyanga 'think'; Kayardild *marralmarutha* 'think about, miss'; Burarra *borrwa-* '1. think, consider, remember, recall 2. look after, be concerned with'.

Nonetheless, a significant number of languages have polysemies including this range:

Ngar	*yangkura*	'hear, understand, think'
Kukatja	*kulila*	'1. hear 2. listen 3 understand, think 4. recognise 5. obey 6. auscultate'.
Pitj/Yank	*kulini*	'1. listen to, heed; 2. hear; 3. think about; 4. decide; 5. know about; 6. understand; 7. remember; 8. feel bodily sensation; 9. have a premonition'
Luritja	*kulinu*	'heard; understood; thought; believed and obeyed what has been told you'
Warluwarra	*rlari-*	'hear, listen; understand; think'
Banjalang	*gannga-*	'hear, listen, think, understand, feel'
Ngalakan	*banarr-*	'to hear, listen, understand, think about'

Example sentences for four of the uses of Kukatja *kulila* are:

(49) *Kurrunparanintirrinpa, kurruntu kulirninpa langakurlu puntungkalu nyininpa.* Kuk *Kulirninparna wiyarna purtarrinpa.*
'The spirit becomes knowledgeable; the spirit understands by the way of the ear [which] is in humans. I understand, I'm no idiot (lit. not become no good).' (Valiquette ed. 1993:37)

(50) *Kulirninparna yiilku katawana mimikurlulu.*
Kuk 'I recognize the blood [going through] my head when I'm sick.'

(51) *Ngurratipilu kulinma kalyutjirratja.*
Kuk 'He is camping out and is concerned about water.' V 156.

(52) *Kamina wiya kulirninpa, yumu tjiiwanpa, wiya warnnginytja.*
Kuk 'The girl doesn't obey, she's just unaware (of things). She doesn't desire intercourse.'

In many other languages 'think' is derived from 'hear, listen; understand' by reduplication (52-55), reflexivization (56-7) or incorporation (58).

(52) Wik-Ngathan: *ngeethe-* 'hear, listen'
ngeeth-eche 'think' (reduplication of *ngeethe*)

(53) Oykangand: *aliya-* 'listen, hear'
aliyiya- 'think, recall'

(54) Watjarri: *ngangkunmanja* 'listen, hear' (tr.)
ngangkungangkunmanja 'think' (intr.)

(55) Dalabon: *wonan* 'hear, listen; understand'
wonawonan 'hear, listen (over a period)'
wonarrvn 'think about'
wonawonarrvn 'listen to oneself'

(56) Mayali: *bekkan* 'hear, listen'
bekkarren 'consider, think about before making a decision'

(57) Dyirbal: *ngamba-l* 'hear, listen'
ngamba-yirri-y 'think'

(58)	Ngandi:	*nga-*	'hear' (tr.)
		yic-nga-	'think' (intr.), *yic-* 'thinking, truth'

In Yukulta *marrija* means 'listen, hear' when used transitively, and 'think, feel' when used intransitively (Keen 1983:276); the reduplicated form *marrinymarrija* has a middle case frame and means 'to dream of/think of someone (i.e. to tune into their vibrations)'. This gloss is interesting, suggesting that 'thinking of' is conceptualized less in terms of generating an internal representation and more in terms of tuning in to an object with an external existence.

In addition to extensions from 'hear', many words for 'think' are compounds based on 'ear'. We have seen the example of Kayardild *marralmarutha* 'think about, lit. ear-put' as well as Walmajarri *pina-pina-karrinyu* (ear-ear-stand) 'think'; a similar series in Gugu Yalanji, based on *milka* 'ear', is *milka-bu wukurril* (ear-with follow) 'to think about', *milka dumbarril* (ear break) 'to think about', and *milka-bu baykul* (ear-with ?) 'to think about'. Sear (1995) contains a comprehensive listing of ear-based compound verbs for 'think' in Australian languages.

5.3.4 'Hear/listen' to 'Know'

A few languages show direct extensions of 'hear, listen' to 'know'. In most cases the semantic range also includes 'understand' and/or 'think', as with Wakaya *larr-* 'hear, understand, know' (Breen pc), Yawurru *langka-* 'know it, hear him, understand', Warlpiri *purda-nyanyi* 'hear, listen to; understand; know; recall; perceive; judge; determine etc.', Ngarluma *wanyaparri(-ku)* 'hear, listen, know, recognise, know how to, listen to, think it is X', and Pitjantjatjara *kuli-* which can have the meaning 'know about' (59) in addition to the semantic range discussed in §5.3.3 above.

(59)	*iriti-la*	*takata*	*kulintja*	*wiya.*
P/Y	long.ago-LOC	doctor	hear/know-NOMZR	NEG
	'In the old days we didn't know about doctors.'			

An example involving derivation is Wemba-Wemba *nyernda* 'to know, understand', from *nyerna* 'to hear' (Hercus 1994:118).

There is evidence from some languages which use 'hear' for 'know' that the use is confined to cases where the sensory modality giving rise to the knowledge is hearing. Dixon (1993), commenting on the lack in Dyirbal of a lexical exponent with the precise meaning 'know', points out that there is no way to say 'I know where the money is' – instead one would say 'I saw where the money is' or 'I heard where the money is'. Another example is Gugu Yalanji, in which *nyajil* 'see, hear' is also used for knowledge reached through these senses, whereas knowledge reached by other means is expressed as *jibabu nyajil* 'to know without seeing or hearing anything', lit. 'see/hear with the liver':

(60)	*mari*	*doctorangka*	*jiba-bu*	*nyajil*	*yina*	*jalbu*	*wulay*
KYal	man	doctor-ERG	liver-with	perceive	that	woman	die
	'The doctor man knows by instinct that woman will die.' (Oates 1992:103)						

5.3.5 'Hear/listen' to 'Remember and recall'

Some dictionaries of English give 'remember' as a distinct sense of English 'see', e.g. Macquarie: 'see 3: to imagine, remember, or retain a mental picture of: *I see the house as it used to be*'. Australian languages consistently have 'remember' either as an extension (direct or indirect) of 'hear' or as a derivation or compound of 'ear'. In Wemba-Wemba *nyerna* has the semantic range 'to sit, to listen, to hear, to remember'; Gugu-Yalanji has *milka nyajil* lit. 'see with the ear' means both 'to hear' and 'to recollect'; note also *milkabu manil* 'remember', lit. 'get with the ear'.

A couple of the languages we have already seen include 'recall' in the semantic range of a verb extending from 'hear' to 'know': Warlpiri *purda-nyanyi* 'hear, listen to; understand; know; recall; perceive; judge; determine etc.' and Nunggubuyu *yanga* 'hear, listen to, understand, remember, think about'.

An obvious bridging context for the development from 'hear' to 'recall' is the recollective hearing of remembered names (which may simply be metonymic projections of nouns designating the objects). Dixon (1991:37) furnishes a nice example: the Yidiny verb *binangal* means 'hear, listen to (O can be noise, or people); think about, remember (O can be people, place etc.)', and his careful translation of the following example suggests how 'remember' arises by implicature from 'listen to':

(61) *bamaan guwal jarral galiingal / garru binangalna bulmba wanyja galing*
Y [Guyala replied:] 'People's names must be given to places all along the way. So that by-and-by [people] can listen to [and remember the sequence of place-names along a route and know] where the places are going to.'

A similar example from Dalabon is (62), from a story recounting a hunter's revenge on a group of Mimih spirits who tricked and assaulted him; at this point in the text he is trying to find his way back to the place where they attacked him and proceeds by 'hearing' in his mind the names of the places along the way. Although the Kriol translation Evans was given for this sentence was "he bin know himself where he's going", the best translation into standard English would be 'remembered the way'.

(62) *"ngale! kvhrdvh-kah kvhrdv-kah kvhrdvh-kah" kah-rok-wona-rre-ninj.*
D oh.yes this.way this.way this.way 3-way-hear-RR-PP
"Oh yes, along this way, this way, this way" he remembered / recalled / knew the way along.

We might wonder whether the range of such verbs is confined to aural and verbal recollection, or is more general; unfortunately few sources are explicit on this point. In Pitjantjatjara/Yankunytjatjara, however, it is clear from the following example that visual recollection is included in the 'remember' sense of *kulini* 'hear; listen; heed; think; know; remember':

(63) *yunpa-ṉa puṯu nguwan kulini*
P/Y face-I in.vain hardly hear/remember
'I can't really remember the face.' [Goddard 1992:39]

More common than the extension of 'hear' to 'remember' is the use of a distinct verb, often based on the noun for 'ear': examples are Arrernte *irlpe-angkeme* (ear-speak) 'remember', Djabugay *binarra-y* 'remember' (cf bina 'ear'), Yir Yoront *pinal=yam* 'remember, lit. ear-carry', Nyawaygi *bina-mbi-Ø* (ear-INCHoative) 'understand; remember' and Wik Mungkan *konangam pi'an* 'remember', lit. 'mind, keep or look after with the ear'. It is also worth reiterating at this point that in Jiwarli *kurlga* 'ear' is glossed as 'remember' when used as a particle. Many other expressions having to do with memory are also typically based on 'ear' - e.g. Kayardild *marraldunbuwatha* 'forget, lit. ear become useless', *marraldurldiija* 'forget, lit. ear-shit', and the many Nyulnyulan languages in which one says, for example, 'my ear is him' (e.g. Bardi *alamar i-nen djen*) for 'I remember him' and 'my hear it is him hurricane' (e.g. *Nimanburru nalebab inan djen williwilli-en*) for 'I still remember that terrible hurricane' (Bill McGregor p.c.).

5.3.6 Extensions of 'hear' to the cognitive domain: summary

We have seen that 'hear' regularly extends to a number of verbs in the cognitive domain: not only understanding and obeying, but also thinking, remembering and knowing. Figure 12 summarises just the direct, polysemous, extensions from 'hear/listen' that were discussed in this sub-section. However, we have also shown that there are numerous indirect, derived, extensions from 'hear; listen' which show the same regular pattern of

association to higher cognition. Moreover, evidence was presented that shows derivations based on 'ear' also replicate the pattern. So, this is no novel occurrence, but a strongly recurrent theme which runs counter to Sweetser's proposal concerning the types of extension we should expect with 'hear'.

Languages	HEAR / LISTEN	UNDER STAND	THINK	KNOW	REMEMBER / RECALL	OBEY / HEED
D; K; A; Alyawarre	+	+				
Wik Mungkan	+	+				+
Ngaliwurru, Banjalang, Warluwarra	+	+	+			
Nunggubuyu	+	+	+		+	
Kuk; Luritja	+	+	+			+
Pitjantjatjara	+	+	+	+	+	+
Warlpiri	+	+		+	+	
Yawurru; Wakaya	+	+		+		
Ngarluma	+		+	+		
Yidiny	+		+		+	
Wemba-Wemba; KYal	+				+	
Lardil	+					+

Figure 12: Patterns of polysemy: Direct extensions of 'hear/listen' to cognition senses

This pattern reflects an Australia-wide tradition that the ear is the organ of intellection as well as hearing. As we show in §7, there is a cluster of rationales underlying this network, such as grasping language, stories and names as the key to socially transmitted information, and the summoning of verbal/aural records in recollection. But, although verbal recollection may be prototypical, the resulting cognitive verbs extend to all sorts of mental construct and cognitive processing: for example, remembering or knowing faces, as well as names and sounds. We will now see how this pattern of extensions contrasts with the extensions of 'see' and, less importantly, 'smell'.

5.4 Extensions of 'see' to the cognitive and social domains

Most extensions of 'see' in Australian languages lead into the domain of human interaction: desire and sexual attraction, supervision, and aggression. Such extensions are of course not uncommon in European languages, but make up a greater proportion of the extensions of 'see' verbs in Australian languages.

In general, eye contact is far more communicatively loaded in Aboriginal communities than in European societies (see §7.2). As Hansen and Hansen (1992) note in their entry for the Pintupi verb *nyangu* 'looked; saw':

> the norm is for limited eye contact in conversations and addressing longer gatherings; prolonged eye contact which is the European norm can be offensive, implying that you don't trust or recognise the person; prolonged eye contact with the opposite sex, can be interpreted as a sexual advance; ...

So, we will first consider the somewhat commoner extensions of 'see' to verbs of social interaction, before passing on to the rarer occasions where 'see' extends into the cognitive domain proper.

5.4.1 'Sight' and Social interaction

DESIRE AND SEXUAL ATTRACTION.

Kayardild *kurrija* 'see' is representative in its semantic extensions: in addition to its basic meaning it can extend to 'desire, look upon with lust', as in the phrase *kambin-kurrinda* [daughter-seeer] 'incestuous father', and also 'choose (esp. as spouse)':

(64) *bulbirdiya* *maku-wa* *kurri-i-j*
K wrong.category woman-NOM see/choose-PASS-NFUT
'A woman of the wrong kinship category was chosen (as wife).'

Idioms for flirtation, romantic liaisons and desire that are based on the reflexive-reciprocal form of 'see' are widespread. In Western Arnhem Land such verbs may be used as predicates, as in (65), or deverbally to designate lovers, as in (66); these Dalabon examples have exact calques in a string of neighbouring languages, such as Mayali and Ilgar. Sometimes the noun 'eye' is incorporated, giving an expression which has all the connotations of English 'they look into each other's eyes'.

(65) *barrah-na-rr-vn* *mararradj*
D they-look-RR-NP illicit.affair
'They are looking at one another, (with the purpose of) illicit sex.'

(66) *yarrah-na-rr-vn* *ngey-kvn*
D 1a-see-RR-NP 1sg-GEN
'my girlfriend/boyfriend' [lit. 'mine (such that) we gaze at each other']

In Pintupi there are a number of idioms which include both *kuru* 'eye' and *nyangu* 'see' and have sexual interpretations or connotations. Thus the phrase *kuru nyakula pungu*, which literally means 'seeing (her) eye hit (it/her)', is used to indicate that someone 'realised another's desire; i.e. another of the opposite sex'. In a note to the idiom *kuru nyangu* (eye saw) 'stared at; peered at', Hansen and Hansen (1992:41) write "to stare a known person in the eye is ill mannered as it can imply ulterior sexual motives". Other related idioms based on 'eye' include *kuru-ku mikurringu* (eye-for desire) 'to desire a frienship with one of the opposite sex' and *kuru-lu nintinu* (eye-with show/teach) 'indicated with the eyes; a means of making arrangements with the opposite sex to get together.' Other Western Desert languages show similar idioms, thus we find Pitjantjatjara, *kuru nyanganyi* (eye-see) and *kuru wangkanyi* (eye talk) both meaning to 'make eyes at someone, flirt', and in Kukatja, *kuru-kankurrarriwa* (eye-become.unable.to.see) 'become sexually awake'. Such, idioms based on 'eye' are not confined to the Western Desert languages. For instance; while the first meaning given for Alyawarr *annga atherrk-atherrk* (eye green) is 'like you're blind, getting the wrong thing', the second extended meaning is 'someone who marries "wrong way", marries inapproprate relations' — the associated gloss given to the cognate Arrernte term, *alknge atherrke-atherrke*, is '[offensive language] someone who is doing wrong by taking a partner who is the wrong "skin" for them or who is already married'.

AGGRESSIVE AND OTHER NEGATIVE SOCIAL INTERACTION.

Extensions to agression are not common with the verb 'see' itself, but in languages that combine a 'see' auxiliary (or light verb) with an uninflected lexical verb, the collocations can denote a range of aggressive social acts. In Tyemeri, for example, the auxiliary *nginnyinggin*, which on its own means 'see', participates in the following collocations: *tisit nginyinggin* 'to be jealous of someone' [*tisit* only occurs in this construction], *nginipup nginnyinggin* + IMPERS 'be made to feel out of place, or ill at ease' e.g. *dengini dinyingginngi nginipup* 'I felt out of place' [*dengini* 'body', *nginipup* 'body rub']. In Jaminjung, which is structurally similar, one example of the verb *-ngawoo* 'see' used on its own has been attested in the extended meaning of 'argue', but far more commonly 'argue' is rendered by combining the coverb *wirrij* 'fight' with *-ngawoo* 'see'. Schultze-Berndt (in prep) notes that other coverbs which combine with the verb *-ngawoo* 'see' to render complex verbs of aggression are *dirrija* 'jealous', *ngarl* 'bark', *nyool* 'sulk' and *gambaja* 'laugh'. In Mayali the compound verb *widnan* , built from *-wid* 'different' and *-nan* 'to see', means 'to hate', lit. 'to see as different' or 'to look at as one looks at someone different'.

There are also idioms based on 'eye' indicating negative and aggressive social interaction. Thus in Arrernte we find *alknge-uthneme* (eye-bite) 'be jealous of someone'. Similarly, in Yidiny we find *jili-guba-N* (eye-burn) 'feel jealous towards someone', and

also *jili-gunda-L* (eye-cut) 'make someone look away (by staring at them and making them ashamed)'. Finally, in Pintupi, two idioms of agression are *kuru watjanu* (eye said) 'accused to face; blamed to face' and *kuru panypurangu* (eye spoke.against) 'belittled to his face; rubbished to his face'.

SUPERVISION AND OVERSEEING.
Many Australian languages extend derivatives of 'see' (often the reduplicated form) to mean 'watch over, supervise, oversee' and so on, just as European languages do. Examples are Mayali *nan* 'to see', with its reduplicated form *nahnan* 'look after, watch over, care for, look out for', as well as the derivative *worhnan* 'look after, be the boss of'; Gaagudju *goro-garra* 'to see', *goro-garra-garra* 'to look after', and the Jaminjung preverb plus auxiliary combination *mayimayibba gani-ngawoo* [preverb he/him-sees] 'he thinks about someone, worries about someone'. In Arrernte, the verb *arntarnte-areme* 'to look after, to care for' is built on the verb *are-me* 'to see; look', and, historically, the verb *akareme* 'to keep an eye on something for someone' is also likely to have been derived from the 'see' verb.

Parallel derivations based on 'eye' include Yidiny *jili-budi-L* (eyes put down) 'look after', Kuku-Yalanji *miyil-da kujil* (eye-with keep) 'to guard something (keep one's eyes on it)' and Pintupi *kuru yutura kanyinu* (eyes hiding kept) 'carefully looked after; cared for'.[31]

MEETING AND VISITING.
As a final case of the extension of 'see' in the social interactional domain, we find that in some Australian languages the verb which means 'see' extends directly to 'meet' and/or 'visit'. This is, of course, similar to English uses of 'see', as in "I'll be seeing Pat tomorrow". In Arrernte, for example, the full meaning range given by Henderson and Dobson (1994) for *areme* is '1a. look at something, see, watch; 1b. visit someone; 1c. meet someone, meet up with him; 1d. find something or someone, come across; 2. look for something; 3. look to be a certain way; 4. shine on something; light it up'.[32] 'Meet' is also one of the senses of the Kurtjar verb *ak* 'perceive; see'. For Yidiny *wawa-L* 'look at, see', Dixon (1991:260) notes that "[t]his very frequent verb ... has a wide meaning including: look for, find, encounter", and it seems likely that a 'meet up with' sense often derives through pragmatic extension from a simple 'encounter' ('come upon') sense where human beings are the object of the action. Other examples in which 'vision' and 'meeting/visiting' are clearly associated are Walmajarri *pirmarnu* 'peep, as looking from round a corner; peer into something, as a hollow log when looking for game; visit' and Kukatja *ruunyala* 'see and meet'.

5.4.2 Extensions of 'See' to cognition

RECOGNITION, KNOWLEDGE.
A few languages extend 'see' to mean 'recognize (visually)', often with an incorporated word for 'body'; sometimes this extends on from 'recognize' to 'know'. Thus one Mayali derivative of 'see', incorporating the root *burrk-* 'body', is *burrknan* 'recognize'. A related language, Ngalakan, extends the sense of the cognate verb bur?ṇa- to 'know, understand', although the one example sentence in the source (Merlan 1983:192) could equally well be translated with 'recognize (visually)':

(67)	ŋu-bur?ṇani-koro	ṇugun?biri	bigur
Ngal	I/him-know-PRES.NEG	that	man
	'I don't know that man.'		

Warray *na-* 'to see' gives rise to the compounds *let-na* 'to look after' and *mitj-na* 'to know, to recognize'.

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[31] Hansen and Hansen (1992:41) explain this idiom more fully by noting it is "used of closely caring for an older person when they are mourning death of one of their friends or relatives."

[32] Other Australian languages also have an extension of 'see' to 'shine'. For instance, Gooniyandi (McGregor pc) *mirri milaa* (sun he:sees:it) 'the sun shines'.

The 'see' auxiliary in Tyemeri occurs in two collocations concerned with recognition: *yilil nginyinggin+* 'to be able to recognize something', but the only available example involves visual recognition (more specifically, looking but not recognizing), and *miyilil nginyinggin+* 'recognize someone or something'.

In Warlpiri 'see' can take on a judgment or evaluation sense, with state-of-affairs complements only (§5.1); this use has not been reported for other Australian languages.

In a number of languages, we find that the verb 'see' can take clausal complements, "direct quotes", which represent a deduction based on visual evidence. For Gooniyandi, McGregor (1990) discusses what he terms "projection of thoughts", and notes that the verb *mila-* 'see' can enter in to the same construction as verbs referring to mental processes (like 'think'). He writes (1990: 421-422) that "[i]n this case, the projected clause represents a thought that was perceived, or which was based on perceptual evidence". Such constructions typically translate into English as 'X saw that "Y" [clausal deduction]', but always entail actual visual perception at the source (i.e. visual evidence is the source for the deduced/projected thought). A Gooniyandi example with *mila-* 'see' projecting a direct quote is:

(68)	*yoowooloo-ngga -nyalimila*	*winbidda*	*boolgawoolga-ngga*
Goon	man-ERG-REP	they:saw:them	old:men-ERG

aa	*ngamoo*	*girli*	*boolgawarri*	*garingi*	*ngangbada*
ah	before	same	he:is:getting:old	wife	we:will:give:him

'The old men would see "he's getting old, we'll give him a wife"'.

Other languages which have similar constructions with the 'see' verb are Mangarrayi and Ungarinjin. Given that, in European languages, such deductions on the basis of visual evidence or visual recognition are the typical precursor to extensions of 'see' into cognition uses without any entailment of visual perception, it is significant that this relatively common construction in Australian languages does not appear to give up its perception interpretation very easily.

Only three Australian languages that we know of have some evidence of 'see' developing to 'know' or 'think' without first passing through 'recognize', as in the Ngalakan case. All three cases, however, are not straightforward and present problems of interpretation. First, the Kaurna language, spoken around Adelaide and long virtually extinct, uses *nakkondi* 'to see, look; to know', but the peculiar sociolinguistic situation here — in particular, the embedding of the verb *nakkondi* in Aboriginal English over a lengthy period — means it may have come under influence from English semantics. Second, Guugu Yimidhirr *nhaamaa* has the semantic range 'see, look, hear, think', but we cannot tell whether the development to 'think' was from the 'see' or the 'hear' sense. In support of the hypothesis that 'think' developed from the 'hear' sense of this form, we would note that when the verb is compounded with the form for 'ear', *milga*, to give *milgan nhaamaa*, the resulting meaning range is 'listen, remember, think'. Finally, in Arrernte, the verb *itele-areme* 'know; realise; remember; think; understand' is originally a compound formed from *ite-le* 'with the throat' and *areme* 'see; look for; meet; visit' (i.e., literally 'see with the throat'). As noted in §3, such compounds can be problematic because one does not know whether the semantic extension is a property of the perception verb, the compounding element or the unified compound. In the Arrernte case, there is good reason to believe that it is the element *ite* 'throat' which is primarily responsible for the cognition reading of the compound. For one thing, the common verb for 'to think', is a simple intransitive verb derivation with the inchoative suffix, *-irre*, added to *ite* 'throat' : *itirreme* 'think; think about; think that; worry'. As Henderson and Dobson (1994:426) note "[i]n Arrernte, the throat is involved in certain expressions that involve thinking, wanting and some similar feelings" (see also Van Valin and Wilkins 1993: 523-524). There is no other evidence of 'see' or 'eye' extending into the domain of cognition in Arrernte, although as we have shown in §5.4.1, both these notions have extensions into the realm of social interaction.

5.5 'Smell', 'taste' and 'touch'

In a very few languages 'smell' has limited cognitive extensions: Nunggubuyu *yarra-* 'to smell (something)' can also mean 'to detect, to sense (something)'. Two languages that appear to have shifted the meaning of the 'smell' etyma **bany-rdi* and **nuuma-* (PN *nyuuma-*) (see §4.1.2.3 above) are Paakantyi: *parnta-* 'to search, to look for, to come out', presumably via 'sniff out', and Wemba-Wemba *nyuma-* 'to recognize, know' and *nyumila-* 'to think', presumably via 'recognize by smell' with later generalization to 'recognize' and 'know'.

The remaining two senses, 'taste' and 'touch' have no significant extensions into the cognitive domain in Australian languages.[33]

5.6 Overview of the trans-field extensions from perception to cognition

To summarize the main finding of this section, we have shown that, within Australia, 'hearing' is the only perceptual modality which regularly maps into the domain of cognition throughout the whole continent. The evidence gathered here speaks against Sweetser's (1990:43) suggestion that "hearing is connected with the specifically communicative aspects of understanding, rather than with intellection at large." In Australia, where 'hear/listen' regularly extends to 'think', 'know' and 'remember', as well as 'understand' and 'obey', we find a pattern which is very distinct from the European one. The novelty in Australia is for a verb meaning 'see' to develop a trans-field usage meaning 'know' or 'think'. When 'see' extends outside of the domain of perception, it most commonly shifts into the domain of social interaction where it gives rise to verbs in four distinct semantic sub-domains: (i) desire and sexual attraction; (ii) aggression and negative social interaction; (iii) supervision and overseeing; and (iv) meeting and visiting. Even where 'see' does make a move towards the realm of cognition and intellection, it rarely loses its moorings in strictly visual perception. Thus, we have seen that it commonly takes on a 'visual recognition' reading, and also a deductive or "projected thought" use, but only where the cause of "projected thought" is rooted in visual perception. Of the few examples we've managed to gather of 'see' to either 'know' or 'think', a majority are indirect (derived) shifts, and the only case of a direct (polysemous) shift which does not have a question of interpretation hanging over it is the use of Warlpiri *nyanyi* 'see' with a judgment or evaluation sense when used with a state-of-affairs complement ('think/consider/reckon X to be good/bad').

The major patterns of extension found for the 'hear' and 'see' are replicated in extensions from 'ear' and 'eye' respectively. That is to say, direct and indirect trans-field extensions of 'ear' are most often into the realm of cognition and intellection, while those of 'eye' are most commonly into the domain of social interaction.

As Sweetser would predict, the three lowest modalities on the perception verb hierarchy are even more limited than 'see' when it comes to the extent to which they map into the domain of cognition. There are some few examples where 'smell' extends to 'know' and 'think', probably via a 'recognize by smell' usage. There are no examples of verbs of cognition arising from 'taste' or 'touch'. That is to say, in Australia, it is only

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[33] This applies to the meanings 'touch (with one's skin)', but there is one possible extension of 'feel (proprioceptive)' to 'ponder', as suggested by the gloss Hansen and Hansen (1991) give the Pintupi verb *miranu* 'felt; perceived; pondered'. However, it is clear that they are treating this as homophonous with respect to *miranu* 'saw; witnessed; observed'. It is likely, however, that these should be treated as the one form with related meanings, given the following glosses for the cognate form in other Western Desert languages: Pitjantjatjara/Yankunytjatjara *mirani* 'view; watch; witness something happening', *mira-mirani* 'watch, keep an eye on something'; Ngaanyatjarra *mira-* 'gaze, to watch carefully'; and Kukatja *mirala* '1) wait; 2) feel (emotions); 3) feel (bodily sensations); 4) keep lookout for; 5) touch'. It would appear that the original meaning of this verb has to do with visual perception and that it has extended to 'feel (proprioceptive)'. Thus, it is not obvious whether the 'ponder' meaning in Pintupi extends out a 'visual' perception reading or a 'feel (proprioceptive)' meaning (or even a 'touch' or 'wait' meaning).

those perception verbs which do not involve contact which are attested as extending into the domain of cognition (with a hierarchy of 'hearing' > 'sight' > 'smell').

In the next section we show that these same patterns are reflected in evidence from other semiotic systems, and in §7 we will attempt to provide ethnographic data which will help to explain why it is 'hearing', rather than 'sight', which is linked to intellection at large. The 'anthropologists of the senses' are clearly right about cultural relativity when it comes to trans-field metaphorical mappings from 'perception' to 'cognition', even if they were wrong about relativity in the intra-field ordering of perceptual modalities.

6 Evidence from Other Semiotic Systems

In the previous sections we have concentrated on data from the everyday registers of Australian languages. However, in §1, we noted that one of the reasons Australian languages are particularly interesting and important for the general study of polysemy and semantic change is that they provide a further window on semantic relations in the form of special auxiliary registers. Typically the indigenous auxiliary registers used by Australian communities have a smaller vocabulary and concomitantly more abstract or hyperpolysemous word meanings, making them extremely useful for the study of semantic structure (cf. Dixon 1971; Hale 1971, Haviland 1979a, Hale 1982, Evans 1992a, Wilkins 1997). Evans (1992a:488) has noted that it is an open question as to how far semantic associations evidenced by other semiotic systems will parallel those of everyday language. Similarly, Wilkins (1997:414) argues that:

> everyday language is just one of a number of semiotic systems which a speech community has at its disposal, and so one should not only look to other everyday languages to provide independent documentation of a semantic association, but one should also cross-compare semiotic systems.

In this section, therefore, we will examine the extent to which data from other auxiliary registers parallels or diverges from the findings in §4 and §5. Where possible, we have examined evidence from three types of registers: respect registers, initiation registers, and sign languages.

RESPECT REGISTERS.

Many Australian languages have special respect registers used between those kin whose mutual relationship calls for, and is constituted by, respect and circumspection. In the literature these have been variously known as 'mother-in-law languages' (Dixon 1971; 1990), 'brother-in-law languages' (Haviland 1979a), 'respect registers' (Alpher 1993), 'respect vocabularies' etc. - see McGregor (1989) for discussion. In Kunwinjku/Mayali a distinction is made between *Kun-kurrng*, literally 'mother-in-law/son-in-law language', and *kun-wok-duninj* 'proper/ordinary language'.

The reduced vocabulary of respect (and other) registers results in the telescoping of a number of everyday-register words under respect terms that may be considered abstract superordinates - e.g. the collapse of the everyday Kunwinjku terms *-yo* 'lie' and *-ni* 'sit' under the Kunkurrng ('respect') term *morndi* . This many-to-one relationship can also manifest itself more extremely in what we have termed hyperpolysemy (Evans 1992; Wilkins 1997) where a single special register form covers a range of everyday terms whose meanings are linked in a mixed chain of metonymic and metaphorical links. For example, the Kun-kurrng term *kun-mimal* subsumes the four ordinary language terms *kunak* 'fire, firewood', *kun-djahkorl* 'firestick', *kun-dolng* 'smoke' and *kun-dung* 'sun'.

In the realm of perception and cognition verbs we find that Everyday Kuninjku, for example, distinguishes *-bekkan* 'hear, understand (language); feel' from *-bengkan* 'understand (generally), know'[34]; while the respect register Kunkurrng collapses both

[34] The similarity in forms is due to the fact that the etymologies for both forms involve the same basic root *-kan* 'carry', compounded with a noun - *beng(h)* means 'faculty of cognition', while *bek-* is of unknown provenance, though it may be an old assimilated double of *beng(h)*. There is some evidence that

under the term *-marrngalahme*. Thus the semantic range of this respect form is 'listen, hear; understand; know' and we see an association of 'hearing' and 'knowing' that manifests itself not in the everyday language, but in the respect register. This then, is parallel to the findings in §5.3.4, and fits with the general pattern, discussed in §3, for polysemous senses to be distinguished formally in some languages but not in others.

In nouns there is also an interesting parallel which reinforces our findings concerning the importance of 'ear' in the domain of cognition and intellection. Unlike many Australian languages, everyday Kuninjku / Mayali does not have a single form with the range 'ear; faculty of cognition and intellection', e.g. Kayardild *marralda* 'ear; faculty of hearing and cognition', discussed in §5.2. Instead, it distinguishes *kun-kanem* 'ear' from *kun-beng* 'faculty of cognition and understanding; intelligence'.[35] In the respect register, however, there is a single noun to cover 'ear' and 'faculty of understanding': *kun-mardorrk*. The respect language nominal root *mardorrk* also forms the base for a number of compound verbs denoting cognition, such as *mardorrkngukbonghme* and *mardorrkmidjarrberlme*, both meaning 'forget'.

In the Guugu Yimithirr respect language (*Guugu Thabul*), we find two pieces of evidence which confirm observations made previously. Firstly, the sense ranges of both the everyday verb *nhaamaa* 'see; look; hear; think' and the everyday verb *waamil* 'find, visit, meet' are collapsed under the single respect term *midu-ngal*. This is consistent with the association of 'see' with social interaction exemplified in §5.4.1, and especially reaffirms the association of 'see' with the subdomain of 'meeting and visiting'. Secondly, in connection with the close association of 'taste' with 'eat' and 'bite' which we noted in §4.2.4, we find, that the everyday Guugu Yimithirr verbs *baadal* 'try; taste', *budal* 'eat' and *thuumbil* 'swallow' can all be replaced by the respect vocabulary term *bamba-ngal*.

Dixon (1971; 1972), in writing about the Dyirbal respect language (*Jalnguy*), has noted that an everyday language verb and all its hyponyms will tend to be replaced by a single equivalent in the respect language. Thus, for example, the respect term *nyuriman* replaces the everyday basic verb for 'see; look' (*buran*), as well as eleven other everyday language hyponyms of 'see; look' (including *waban* 'look up at', *wamin* 'take a sneaky look'; *rugan* 'watch someone going', *gindan* 'look with the aid of a light', and so on). If necessary, the meanings of the more specific everyday hyponyms could be expressed more precisely in Jalnguy by adding modifiers or further phrases to *nyuriman*. For instance, the everyday verb *waban* 'look up' "would be expressed by *yalugalamban nyuriman*, with the verb preceded by a verbalized verb marker involving the bound form *gala* 'vertically up'. Similarly, *gindan* 'look with a light' would be rendered using the Jalnguy phrase *ngarrgana-gu nyuriman*, and this is composed of the respect form for 'light', *ngarrgana*, in the instrumental case, preceding the general verb *nyuriman*. The everyday form for 'see; look' in Dyirbal is only ever rendered as *nyuriman* in the respect language, and cannot receive a more specific description. Dixon uses these facts to argue for a distinction between 'nuclear' and 'non-nuclear' verbs, which for our purposes can be thought of as the distinction between basic superordinate verbs and their semantically more specific hyponyms. This supports the position we took earlier in the paper, of concentrating only on basic verbs of perception rather than hyponyms, and demonstrates how evidence from an auxiliary language can help shed light on the hierarchical structure of the everyday lexicon. Moreover, as Dixon argues, we can regard the respect language paraphrases of more specific, non-nuclear, verbs as definitions which provide insight into the semantic structure of particular verbs.

Although, as we would expect from our prior discussion, there is no evidence that the Dyirbal respect term *nyuriman* 'see; look' is used to cover or paraphrase notions of

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bengkan is an east-side innovation: the westerly Gun-djeihmi dialect uses instead the form *burrbun* , with deep cognates in the neighbouring Iwaidjan family (e.g. Maung *wurru* 'think, know'), eastern dialects use *bengkan* alone, while central dialects have both forms side by side.

[35] The root *beng* is found in a number of cognitive adjectives and verbs, such as *bengwarr* 'crazy' [beng-bad], *bengngukme* 'forget' [beng-shit], *bengyirri* 'be attentive' [beng-COM-stand], *bengdayhke* 'remind' [beng-stand-CAUS], *bengbun* 'make distracting noise, annoy, disturb' [beng-hit] etc. In many Australian languages, these would be derivatives of 'ear'; however, the only verb in this set based on 'ear' is *kanemdubberran* 'forget', a synonym of *bengngukme* that literally means 'ear-block-itself'.

cognition or intellection, we do find some circumstantial evidence in Jalnguy which connects 'hearing' with cognition. Dixon, in discussing the everyday Dyirbal verb *ngamba-L* 'to hear, listen to' (1990:23), notes that while it has a monomorphemic equivalent in the respect language of one of the Dyirbal dialects, in two other dialects the respect language form is a compound, *digirr-julbamba-l* (temple-put), which literally means 'to put one's temple down'. Dixon explains the connection by noting that "the temple is believed to be the location of the brain, and being able to hear properly is an important sign of intelligence."

One very important reason for including respect and initiation registers in one's comparative investigations is that terms in these registers are frequently cognate with terms in the everyday register of other languages.[36] For instance, in Guugu Yimithirr the everyday terms *nguyaarr* 'a dream' and *nguyaarr-ngal* 'to dream' are replaced in the respect language with *bitharr* and *bitharr-ngal* respectively, and it is the respect forms, not the everyday forms, which are cognate with the first element of the everyday Yidiny forms *bijar+baja*-L (dream-bite) 'to dream v.t.' and *bijar-wanda*-N (dream-fall) 'to dream v.i.'. Interestingly, the Guugu Yimithirr everyday form for 'dream', *nguyaarr*, is cognate with the first element of the everyday Yidiny forms *nguyarr+gada-N* 'to think about v.t.' and *nguyarr+wanda-N* 'to think about v.i.'. In other words, both the everyday and the respect language forms for 'dream' in Guugu Yimithirr have cognates with Yidiny everyday forms: the respect form is a full cognate and the everyday form is a semantically shifted cognate. This association of 'dream' and 'think', in part, parallels the Yukulta data discussed in §5.3.3 which evidenced a semantic association between 'hear, listen', 'think' and 'dream'.

INITIATION REGISTERS.

A second type of special register is that taught to ceremonial initiates in certain Australian communities as part of the process of formal religious education; notable examples are the Demiin register of Lardil (Hale 1973, 1982; Hale and Nash 1997) and the *Jiliwirri* register of Warlpiri (Hale 1971).

The Demiin register is clearly the most extreme case of semantic abstraction and hyperpolysemy in Australian languages, collapsing all the distinctions of everyday Lardil into a vocabulary of less than two hundred terms of great abstraction. For example, the whole nineteen-term pronoun system collapses into a two-way contrast between *n!aa* '(group containing) ego' and *n!uu* 'other'. In other cases long metonymic chains are involved (Evans 1992a). Unfortunately we have little relevant information on verbs of perception and cognition in Demiin, other than the interesting collapse of Lardil *merri* 'hear, listen to; obey, heed' and *kalka* 'be sick, sicken, feel pain, hurt' under the single Demiin lexeme *kuuku*. In §4.2.2 we discussed the common semantic association of 'hear' and 'feel (proprioceptive)', and this collapse in Demiin is consistent with that observation; in fact, Hale and Nash (1997:248) gloss *kuuku* as 'hear; feel'.

The Jiliwirri register of Warlpiri is based on the principle of antonymy: words (but not inflectional affixes) from the everyday language are replaced with their 'antonyms'. Hale (1971:473) notes that Warlpiri men say "that, to speak *tjiliwiri*, one turns ordinary Walbiri 'up-side-down'". As the following example shows, to convey the proposition 'I am sitting on the ground', one must use a Jiliwirri utterance which would translate literally into everyday Warlpiri as 'someone else is standing in the sky'.

(69)	[ordinary Warlpiri]	*ngaju*	*ka-rna*	*walya-ngka*	*nyina-mi*
		I	PRES-1sg	ground-LOC	sit-NPST
	[Jiliwirri]	*kari*	*ka-ø*	*nguru-ngka*	*karri-mi*
		other	PRES-3sg	sky-LOC	stand-NPST

'I am sitting on the ground.'

[36] In fact, the respect forms can also be semantically shifted senses of everyday forms used by the same community. For instance, in Guugu Yimithirr, the everyday form *milga* 'ear' is replaced in the respect language with *$thuba*. In the everyday language, *thuba* means 'mushroom; sponge' and the shift to 'ear' in the respect language is a metaphorical extension.

Hale (1971) uses the set of Warlpiri perception verbs to exemplify how Jiliwirri practice can help to reveal aspects of the abstract semantic structure of a coherent lexical subset. He treats the three everyday terms *nya-* 'see'; *purda-nya-* 'hear; feel' and *parnti-nya-* 'smell' as forming a lexical subfield. We have discussed these terms extensively in previous sections, and will only remind the reader that the 'hear' and 'smell' forms are derived by adding a preverb to the form for 'see'. In Jiliwirri there are no available verbs that function as antonyms for these three terms, either within the set, or outside it. For instance, unlike 'sit' and 'stand' which can function as antonyms to one another, as shown by example (73), 'hear' cannot function as the antonym of 'see'. As Hale writes "the three verbs cannot themselves be contrasted with one another in a way which is obviously consistent with the principle of minimal opposition." To get the 'opposites' of these forms in everyday Warlpiri, one must use strategies of negation (to form 'not to see'; 'not to hear' and 'not to smell'). However, Jiliwirri has a general convention that negatives may not be used to create opposites. Just in the case of the perception verbs, therefore, Jiliwirri resorts to the creation of special forms, leading to the following set (see Figure 13). Note, that according to the principle of antonymic usage, the everyday set of perception terms are used in Jiliwirri to convey their opposites 'not see', 'not hear' and 'not smell'.

yurduyurdu-jarri-	'see'	*nya-*	'not see'
jutujutu-jarri-	'hear'	*purda-nya-*	'not hear'
rdulpu-rdulpu-jarri-	'smell'	*parnti-nya-*	'not smell'

Figure 13: The six perception verbs in the Jiliwirri initiation register of Warlpiri

As Hale (1971:479) observes, "the internal cohesion of the domain is preserved in the form of the *tjiliwiri* coinages — i.e., all share the morphological peculiarity that they are composed of a reduplicated root preposed to the verbal formative" *-jarri* (the inchoative). At the time of his 1971 article, Hale could give an everyday meaning to the root of only one of the three Jiliwirri perception verbs: i.e., he noted that *jutu* "refers to stoppage, closure, and to deafness". With all the work that has been done on the Warlpiri lexicon in the past 25 years, it is now possible to add that the everyday meaning of *yurdu* is 'averted gaze; turned away from' and that of *rdulpu* is 'stuffy; suffocating; stuffed; blocked' (note also the fixed phrase *mulyu rdulpu* 'blocked nose'). In other words, the roots of all three Jiliwirri perception verbs are nominals which, in the everyday language, describe the organs of perception as being in a state where they are unable to perform their normal sensory function (i.e. they are blocked, damaged or averted).

The fact that the everyday forms for 'hear' and 'smell' are both based on the form for 'see' in Warlpiri might have led readers to wonder whether these forms are really better analyzed as hyponyms of the 'see' verb, and maybe *nya-* would be better glossed as 'perceive' rather than 'see'. However, the Jiliwirri facts help to establish that these three perception verbs are all at the same level of semantic specificity within the same semantic field, and that *nya-* really is to be understood as primarily meaning 'see' when used on its own. Moreover, as we have seen, Jiliwirri also reveals that the domain is not structured in terms of minimal opposition. So, at the same time as it reveals a gap in semantic structure (i.e., everyday perception verbs don't have lexicalized antonyms), Jiliwirri provides evidence for the existence and structure of a semantic field that would not be so easy to establish on the basis of the ordinary language.

The secret nature of ceremonial knowledge in Aboriginal society might suggest that the semantic system of initiation registers would not always parallel that of the ordinary system, but it must be borne in mind that "[a]though certain knowledge is restricted to a few people, there are constraints on what that knowledge should be: what is known most widely and what is logically possible within the system of meaning both act as constraints on the content of the more restricted categories" (Morphy 1991:94). Morphy discusses a number of cases illustrating "the proximity of secret to public knowledge and the opportunity for deduction available to uninitiated men and women", and he argues that this "illustrates an intent on the part of the initiated men that women should be able to

understand and share in knowledge of the ceremony" (ibid:90). Keen (1994) has shown similar parallelisms with respect to dance and the construal of ceremonial meanings.

SIGN LANGUAGE.

Many speech communities, particularly in Central Australia, have highly developed systems of sign language (Kendon 1988). These are typically used by non-deaf individuals. The most elaborated sign language usage is found among older Warlpiri and Warumungu women, and is associated with the speech taboo which "widows" in those communities are placed under during the period of mourning (which can last up to one year). However, in many Central Australian communities, all members of the community know and use some (reduced set) of handsigns and signed sentences on an everyday basis, especially in contexts where speech is socially undesirable or impossible. Speakers can readily associate handsigns with everyday language glosses, making the comparison of the auxiliary sign language and the everyday language feasible. As other authors have shown (e.g. Strehlow 1978; Kendon 1988; Wilkins 1997), auxiliary sign use provides clues to semantic structure in two main respects. First, one handsign often corresponds to several semantically related everyday language terms and, as a result, specific ('non-nuclear') everyday terms will be paraphrased ('defined') in the auxiliary sign language with several signs. Secondly, the visual medium of signs allows one to observe very directly the iconic or motivated properties of a handsign or signed utterance.

Kendon (1988: 171-172) discusses Warlpiri signs which involve pointing to the ear or ears, and notes that the manner of pointing varies in a motivated fashion and is revealing of semantic contrasts in the domain of cognition. He observes that many of the signs which point to the ear "relate to the referent indirectly, for the ear now stands for 'channel of understanding'". Close observation reveals that in signs which express effective, positive cognitive functioning — "that is, such meanings as 'wise', 'knowing', 'understanding'" — the pointing shape which approaches the ear is a form of horned hand with index finger and little finger extended, and ring and middle finger drawn in. This same handshape is also used to indicate the notion of "going" or moving freely through space, and might here be taken to indicate that information is moving freely, or that the channels of intellection are open. By contrast, "if the meaning is negative — such meanings as 'senseless, crazy', 'forget', and the like — the hand is a flat (B) which here, perhaps, suggests that the ear is blocked or covered."

The signing of notions relating to the domain of cognition in the region of the ear is very common in Central Australian communities. For instance, with respect to the Kukatja, Peile (1997:50) writes:

> In sign language, a person who points to his ear usually with his right hand, palm forward and outstretched fingers together, is expressing that he knows what a person is speaking about or that he understands the matter under discussion.

Wilkins has recorded a complex Arrernte handsign in which the Arrernte verb *alkngwirreme* 'to forget' is rendered using a sequence of three signs. The first sign is a loose hand, index finger trace around the ear, which variously signifies 'understanding; hearing; information', The second sign is the sign for 'to leave' and the third sign is the sign for 'to disappear'. In other words 'forgetting' is rendered in sign as 'understanding/information leave and disappear'. This is of special interest, since the everyday language form for 'forget' is likely to have originated as a compound involving *alknge* 'eye' and *uyirreme* 'to disappear' (i.e., *alknge-uyirreme*). That is to say, while both the everyday Arrernte form and the auxiliary sign form seem to be premised on the notion of 'disappearing', the former incorporates the 'eye' while the latter incorporates the 'ear'.

Adam Kendon has kindly provided his database of Central Australian signs for us to search. This database contains approximately 1600 entries and is Kendon's entire collection of verified signs collected during fieldwork in 1978, 1981, and 1984-1986 at Yuendumu (Warlpiri), Ti Tree (Anmatyerre), Neutral Junction (Kaytej), Tennant Creek (Warumungu and Warlmanpa), and Elliott (Djingili and Mudbura). We first did a search

for signs enacted in the ear region and the eye region. Our purpose was to gather any body-part, perception, cognition, social interaction and emotion readings which were associated with these signs (other meanings, such as animal names, were ignored). Signs enacted in the region of the ear had the following meanings:

ear	hear	understand
wise, knowing	ponder, solve, think out	know
deaf	without understanding	crazy, senseless, temporarily insane
unaware, ignorant of	be unknowing	heedless
lose	forget	

By contrast, signs enacted in the eye region have the following meanings:

eyes	eyelid, eyelash	tears
bunged up eyes	blind	cry, weep
grief for the deceased	brave, not crying	frown
be wild and furious	fall asleep	sleep
squint	fail to recognize someone	peer
conceal, cover something		

The results are obvious: signs in the region of the ear most commonly take on cognition and intellection readings, while signs in the region of the eye tend to have emotion or perception readings (cf. §5.2). Note, however, that 'see' is not in this list. This is because signs for this notion tend to be enacted with a 'V'-fingers shape in neutral space. A search for signs with this handshape revealed the following collection of notions:

see it, sense it	to see, to look	object of perception (e.g. picture, video, screen)
look for something	look after something	look around
recognize,	not recognize	

Once again, beyond the notions 'recognize' and 'not recognize' (cf. §5.4.2), we do not find any notions in this list which could be construed as belonging to the domain of cognition.

OUTCOMES

While it is logically possible for the different special registers to have independently structured semantic systems, in fact we find that the semantic connections represented in the various respect registers, initiation registers and sign languages which we've been able to examine in this section are completely consistent with our earlier findings based on everyday language data. We have found evidence which supports both our intra-field findings within the domain of perception verbs (e.g. the association of 'hear; listen' and 'feel (proprioceptive)' evidenced in the Demiin initiation register), and our trans-field findings concerning mappings from perception to cognition. Indeed, the sign language data strongly reinforces the now familiar association of 'ear' and 'hearing/listening' with cognitive notions like 'understand', 'think' and 'know', and further helps to confirm that 'eye' and 'see' have little to do with cognition and higher intellection. Importantly, we have been unable to find any data from other semiotic systems which would contradict the earlier findings. Moreover, the data from the Warlpiri initiation register, Jiliwirri, and the Dyirbal respect register, Jalnguy, help to shed light on the internal semantic structure of the perception verb domain in Australian languages, and provide some motivation for a couple of assumptions we've made in this paper (such as the presumed unity of the semantic domain, and the distinct treatment of superordinate verbs and hyponyms).

7 Why does 'hearing' rather than 'seeing' give rise to cognitive verbs?

In this section we ask why Australian languages recruit cognitive verbs from hearing, where Indo-European gets them from verbs of seeing. As we noted in §3, bridging contexts and the inferences they generate are the precursor to conventionalized polysemy. Below we discuss seven cultural factors which are likely to generate the sort of communicative context in which a verb for 'hear/listen' would, by pragmatic inference, gain a more abstract cognitive reading such as 'think', 'know' or 'remember'. The following hypotheses are not meant to be mutually exclusive: rather, we believe that they are mutually reinforcing in the sense of providing a series of convergent factors all pushing semantic developments in Australian languages in the same direction. An eighth, and obvious, hypothesis would be that the prevalence of particular extensions of 'hear' is an areal phenomenon, calqued from language to language. While we believe this is a likely explanation in many cases, we do not treat it below for the simple reason that it would leave unexplained how the phenomenon arose in the languages from which it was diffused.

Before considering these various explanations we need to point out a further possibility that we will not be considering: that different perceptual verbs are sources for cognition verbs because different meanings of 'think', 'know' etc. are involved. While some semantic traditions (e.g. Goddard & Wierzbicka 1994) postulate 'think' and 'know' as semantic primitives, and hence invariant across cultures, it remains possible that there is no one-to-one semantic correspondence between the English verbs and those in Australian languages. For some Australian languages one might venture to argue that 'know' could be defined, for example, along lines like 'because of what I have heard, I say: X; because I heard it from the right people, I can say: X is true'. Similarly 'think of X' might best be defined as 'X is not here; I do something with my ear which is like hearing X; it makes me want to say: X is here'. Mutatis mutandis, one might seek to define 'know' and 'think' for Indo-European languages through the verb 'see'.

A hint in this direction comes from Keen's (1983) gloss of the Yukulta verb *marrinymarrija* 'to dream of/think of someone (i.e. to tune into their vibrations)'. As discussed in §5.3.3, this gloss suggests that 'thinking of' is conceptualized in Yukulta less in terms of generating an internal representation and more in terms of tuning in to an object with an external existence, which would probably give rise to a different definition of 'think'.

Although this more relativist position would be coherent , and would readily account for the different semantic pathways we find, no linguist has done the careful semantic analysis or attempted to elaborate definitions along these lines and subject them to the testing of careful paraphrasing with native speakers that would be necessary to defend this position. We therefore leave it as an untested possibility, and instead try to use ethnographic data to account for different pathways leading to the presumed translationally equivalent endpoint.

7.1 Hearing as the prototype of inwardly-directed attention

One reason Sweetser gives for the dominance of sight-verbs as a source for cognitive verbs is their supposed greater amenability to direction of attention:[37]

> [V]ision and intellection are viewed in parallel ways, partly ... because of the focusing ability of our visual sense - the ability to pick out one stimulus at will from many is a salient characteristic of vision and of thought, but certainly not characteristic of any of the other physical senses except hearing. Even hearing is less consciously and readily focused than vision - I can literally move my eyes from one object to another, while it may require a good deal of effort to attend to one auditory stimulus among many (e.g., to the one conversation in

[37] One problem with this account is that it is the non-controlled verb 'see', rather than controlled 'look at', which develops the cognitive meanings (our thanks to John Bowden for pointing this out).

> which we are participating, rather than to the five others in the room, which are socially considered as background noise). (Sweetser 1990:38-9)

However, ethnographies of communication for Australian languages frequently stress the role of individual choice in selectively directing attention in hearing:

> In my understanding the strong tendency in Aboriginal conversations is to turn the communication channel (talk) on and leave it on; it is continuous..... In the Aboriginal setting, *where I am saying the listener has more control, members of the group can tune in and tune out of the ongoing (continuous) communication at will.....* The Aboriginal pattern of interaction can be viewed as a coping strategy: it enables an individual to opt for privacy but preserve the option to re-engage at any time. Since there are no suitable means of using the built environment to ensure personal privacy, the members of the remote Aboriginal community manipulate the pragmatic environment, keeping the communication channel continually open but only directly engaging when it is appropriate or when they choose to. (Walsh 1991:3-4; italics ours)

> ... typical Aboriginal social conditions of rather exposed camp life and highly developed etiquette of selective orientation and attention to others at any given time.... (Merlan 1989:230-1).

Compared to seeing, the act of directing attention with hearing is internal: directed visual attention can be noted from outside, through movements of the eyes or head, whereas directed auditory attention cannot be observed from outside.[38] This may motivate the use of hearing as the prototypical 'intelligent' sense under conscious control, and the metonymic extension both back from the resultant act of hearing to the attentional switch that enabled it, and forward to the act of understanding and the state of knowledge that follows it.

7.2 The role of 'vision' in interaction: Different conversational styles

The dominant forces in discourse and conversational analysis have tended to presume not only that 'conversation' is a true universal, but also that it can be universally characterized as 'dyadic' and 'face-to-face'. Work by Michael Walsh (1991), already quoted in the previous section, brings this presumption into question. He argues cogently for an important distinction between Anglo White Middle Class (AWMC) conversational style and the conversational style in remote Australian Aboriginal communities. Walsh identifies the AWMC style of talk as 'dyadic' and the style found in remote Aboriginal communities as 'non-dyadic' (broadcast). The differences between the two predominant styles are summarized below:

> *Dyadic (AWMC predominant everyday conversational style)*
> - an ideology of talking in twos
> - talk is directed to a particular individual
> - people should face each other
> - eye contact is important
> - control is by speaker

[38] Or so it is usually said. However, Peile (1997: 47) writes as follows concerning the Kukatja:
> "[When referring] to a person who has keen hearing and perception, they compare [them[to an emu, Dromaius novaehollandiae, with its long neck and erect head. The emu might not have better hearing than other animals, but the way that it cautiously and attentively turns its head from side to side listening to the slightest sound, gives the appearance that it has acute hearing. A person with acute hearing is like an emu, with its head upright and turning from side to side. A person who is not so good of hearing is like an emu with its head bent over in the spinifex."

Non-dyadic (remote Aboriginal communities' predominant conversational style)
- talk is broadcast
- people need not face each other
- eye contact is not important
- control is by the hearer

We have already noted the possible consequences of a model in which "control is by the hearer" (i.e. where there is individual choice in selectively directing attention in hearing). However, two other important factors in interactional style could govern the direction in which 'seeing' typically extends: the nature of 'eye' contact and body-positioning. It is rather mildly stated to say that "eye contact is not important" and "people need not face each other". In fact, as we have already seen in §5.4, eye contact and gaze patterns which follow the European norm are considered offensive in many parts of Aboriginal Australia. A preferred seating pattern among close friends is side-by-side (or even back-to-back), and people will only be "face-to-face" if there is a significant distance between them, or they are separated by something like a fire, and even then the gaze will typically not be directed toward an interlocutor for any significant length of time. The following observations by Harris (1980: 114-115) concerning the Yolngu of Northern Arnhem Land could apply to many communities in Australia:

> For a yolngu to hold a person with his gaze can be a sign of power or can signify a bid for power. Yolngu children are discouraged by their parents from doing this. Some ceremonial rituals demonstrate one figure claiming power over another through open and direct staring. Such direct staring is sometimes thought of as a sign of *madakarritj* ("anger, belligerence"), and sometimes balanda [i.e. Europeans] who want to be "open" and friendly can be misunderstood, through the directness of their eye contact, to be claiming authority or power.
>
> There are two other features of yolngu positioning for communication that are worth mentioning, The first feature is that during large meetings, there is very little eye contact between speaker and audience, and the speaker holds forth in the midst of all kinds of audience activity, himself pacing up and down, staring at the ground, or even turning his back on the audience. The second is that yolngu are accustomed to facing away from each other during conversation in some social settings.

Harris goes on to suggest three contributing factors which may have led to this pattern of interactive behavior: (i) since much of the casual conversational interaction of the community takes place at night in poor light, people may have "adapted to conversation without visual contact"; (ii) kinship rules of avoidance and respect often demand that people in a certain relationship keep turned away from one another, even when they are conversing; and (iii) there are no social rules or contexts which promote direct face-to-face interaction. Whatever the actual reasons are for this pattern of interaction, we would suggest that it makes the gaze, and even facing to 'look' or 'see', highly socially loaded. Such a context would strongly favor extensions of 'see; look' into social interaction, and concomitantly limit their extension into cognition and intellection at large. Moreover, it seems reasonable to presume that a simple phrase like "I hear what you're saying" would be taken to provide greater evidence of direct attention (and intellection) within an interactional style where the norm is gaze avoidance rather than gaze monitoring.

7.3 Hearing as a prototypical way of perceiving objects absent from the immediate scene

It is a cross-linguistically robust observation that visual evidence is considered the most reliable indicator of an event's real status (e.g. the regular ranking of visual evidentials as higher than those of other modalities - see Willett 1988). 'I heard X', vis-a-vis 'I saw X', will therefore fail to implicate the presence or real status of X, for example if 'heard' is taken as a metaphor for perception-like behavior where X is apprehended to consciousness despite its physical absence.

This is supported by the not uncommon occurrence of demonstratives in Australian languages with semantics like that of Dyirbal *ngala-* 'not visible; either audible or remembered'.

Another way of viewing the difference between Australian and Indo-European patterns here is to see the two cultural groups as placing different bounds on when 'see' and 'hear' can be used in a non-literal sense. English and other Indo-European languages readily relax the reality requirement, allowing the use of 'see' for 'mental vision' in sentences like 'I can still see my grandmother's wrinkled old face looking at me the day before she died'. Australian languages are not reported as being able to relax this requirement for 'see', but do it for 'hear' as with many of the 'remember' and 'know' examples we have discussed in §5.

7.4 Different common scripts: knowing the way, knowing the country

Another possible explanation is that particular patterns of lexicalized polysemy reflect the frequency of textual exemplars allowing the corresponding contextual extensions. In the Australian context we might appeal to the frequency both of the practice of learning about country, tracks and routes, and mythological knowledge by hearing them recounted in stories and 'songlines'. A representative quote is:

> 'Tywerrenge and songs come out of the body of the country. ... We're not like whitefella who can take a photograph and say what pretty country it is; we've got the song to sing for that country.
>
> The country has got sacred sites, that stone, that mountain has got dreaming. We sing that one, we've got the song.
>
> Country where we live we've got to show, and country with the song. We've got to follow the line from a long way, from Port Augusta... Country is nothing else but culture.' [Wenten Rubuntja in Green ed. 1988]

The frequency of this cultural practice then engenders a second-order frequency of texts in which knowledge and memory is reported in terms of 'hearing (+>[39] names of) places', 'hearing (+> names of) ways' and so on, making utterances furnishing bridging contexts, along the lines of (64) and (65) above, common enough to serve as templates for lexicalizing this extension.

Further, it is especially in the context of relations to country in which Australian Aboriginal belief systems do not emphasise seeing as giving understanding or knowledge. In discussing Aboriginal art, Sutton (1988) argues that for Aboriginal Australians "there is no geography without meaning or without history. .... The land is already a narrative — an artifact of intellect — before people represent it." Knowledge of country is considered to be one of the defining features of intelligence and accumulated wisdom in Aboriginal communities, but one cannot know anything "deep" or important about country by sight; all the relevant knowledge is accumulated by 'hearing' and assimilating names, Dreamtime stories, songs, history and lore. Therese Ryder, an Arrernte landscape painter in what has become known as the Hermannsburg (or Namatjira) tradition, speaks about the difference between Arrernte and European watercolorists as follows:

> When whitefellas look at Aboriginal country and paint it they see it differently, and they see the land and paint it exactly as it is. When Aboriginal people look at the country this is what happens. This is really the country, and there is an important story in the rocks and rivers. They follow the Dreaming history story as they paint. They think about it as they paint, "This is really important place." Aboriginal people have a lot of knowledge when they are painting the country. Whitefellas are ignorant about country: that's just nothing to him. But he just puts the landscape what he sees in front of him. The way we see it, it's a big thing to paint country. We look at the country and the hills, and put these things, which have really important meaning, in the paintings. The earth itself is a part of us. You feel real proud and happy. (in Green 1992:290)

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[39] Following standard practice we use the symbol '+>' to mean 'implicates'.

7.5 'Hearing' and 'Spirit' in the process of socialization

Several ethnographic works concerning Western Desert language communities have observed that an understanding of the term *kulini* 'to hear; to listen; to obey; to understand; to think' is critical to an understanding of traditional views concerning the socialization of children into adults. For the Pintupi, Myers (1986) links this notion to the child's need to develop an ability to attend to the social fabric of kin relation and learn one's responsibilities to heed and obey appropriate countrymen. He writes (107-108):

> In Pintupi theory, this development is perceived as an increasing ability to "understand." Young children are said to be "unaware," "oblivious," or "deaf" (*patjarru* or *ramarama*) and therefore not responsible for their actions.... Small children are "unheeding" (*ramarama* [deaf]) in that they do not comprehend the importance of social events; rather, they throw tantrums, do not listen to or respond to parents, sit too close to an affine, play with fire, and so on.
>
> ...
>
> What children acquire socially is awareness of others. In the Pintupi view, the concepts "thinking," "understanding," and "hearing" are expressed by a single term, *kulininpa*, which means literally "to hear." The organ of thought is the ear, but emotions take place in the stomach where the spirit is located. To be unaware (*patjarru* or *ramarama*), contrastingly is to have one's "ears closed." Young children do not process the available information about who is present and what is happening. Those who do are said to "know" (*ninti*) or "to understand" — implying that one learns what responses are held to be appropriate for various situations.

In a workshop with Pintupi teachers which was aimed at exploring Pintupi views of education and schooling, Keefe (1992) had the teachers choose what they felt to be the key notions of Pintupi education. The following five terms were chosen (129):

ngurra	camp, home, place, land, country
walytja	kin, countrymen, one's own, belonging to
tulku	songs, ceremonies, objects from the Dreaming
kulintjaku	to hear, to listen, to think
nintirrinytjaku	to understand, to become knowledgeable

As Keefe writes, these "are words that unlock a world of meaning on Pintupi ideas about the person, the culture and the total education process." He observes that while the first three terms cover the significant content for Pintupi "curriculum", the last two terms focus on the process - through the process of 'listening-heeding-thinking' embodied in *kulin-tjaku* (hear-purposive), one attains the end point goal of 'becoming knowledgeable and gaining understanding' which is embodied in *nintirrintytjaku* (knowing-become-purposive). Traditionally, the three identified content areas certainly rely heavily on oral transmission (and aural pick-up), but the development of the ability to properly *kulini* 'hear; listen; obey; understand; think' like other Pintupi people is itself as critical to maturing and taking one's place in society as is the accumulation of information from the content areas.

The above quote from Myers makes reference to the 'spirit', and in much of Western Desert belief the spirit (*kurrunpa*) is linked with maturation, sense of purpose, cognition and the assimilation of information. For another Western Desert group, the Kukatja, Peile (1997: 92-93) writes that there are three stages of the spirit. A first stage is when the fetus is animated by a Dreamtime spirit, and this spirit is "then thought to develop within the human body, a belief underlined by the distinction the Kukatja make between the spirit of a small child and that of an adult." This is relevant to our discussion, because the spirit is centrally involved in intellection and is nurtured by what comes in through the ear, not by what comes in through the eye. The spirit can 'hear', but there is no evidence that it is said to 'see'. Peile (1997: 94), emphasizing the difference between the Kukatja and European views of cognition, observes that:

> in the writer's interpretation of the Kukatja view ... knowledge gained is a permanent quality of the spirit. Particular stress is put on knowledge gained by individuals, as they assume adult status in the ritual life of the community. As a corollary of this notion that life essence is enhanced by religious knowledge and ritual participation, the spirits of some individuals especially those of the tribal doctors and ceremonial leaders are considered to be more powerful than those of others. ... *The following [Kukatja statements] illustrate the fact that cognition is seen as a quality of the spirit rather than something gained independently of the spirit, such as implied in the rationalistic European view of intellection.*
>
> "The spirit become knowledgeable [*nintirrinpa*] ; the spirit understands [*kulirni-npa*] by the way of the ear [*langa-kurlu*] which is in humans. I understand [*kulirni-npa-ma*], I'm no idiot (lit. not become no good). I will have knowledge of it (my spirit will be made good)" [see example 49 above - NRDE&DPW]

In essence, then, we are talking here about a different cultural script concerning the role of audition in the socialization process, and different conceptions of what constitutes valuable knowledge, how it is assimilated, and what the role of the spirit is in effecting that assimilation. In the Western Desert, and probably in other parts of Australia, the visual takes a back seat in the socialization process. This complex of factors would be sufficient to drive a distinct pattern of extension (with associations that are encountered and nurtured from early in childhood).

7.6 Literacy vs. oracy

It is significant that the founding text for the 'anthropologists of the senses' to whom we referred at the beginning of this paper was Ong's seminal piece on the role of literacy in privileging sight as opposed to hearing, which assumes greater dominance in a purely oral culture. Ong (1969:634) argues that:

> Oral or nonwriting cultures tend much more to cast up actuality in comprehensive auditory terms, such as voice and harmony. Their 'world' is not so markedly something spread out before the eyes as a 'view' but rather something dynamic and relatively unpredictable, an event-world rather than an object world.

One might argue that developments from 'see' to 'think' and 'know' are therefore more likely to develop in literate cultures, and, conversely, that developments from 'hear' would mark cultures with a basically oral tradition, reflecting the unchallenged role of spoken transmission in acquiring knowledge.

If this were so, Australian languages should not be the only ones displaying the sorts of extensions discussed in this paper: they should be common in languages spoken in other preliterate cultures. Although some of the examples reported in Howes (1991) indicate that 'hear' can extend to 'think' in other parts of the world as well – Hausa and Ommura examples have already been discussed, and Seeger (1981) reports similar patterns in the Brazilian language Suya[40] – a widely-cast cross-linguistic study is needed to test this hypothesis carefully.

[40] In Suya the same verb, *ku-mba*, is used for hearing, understanding and knowing. 'When the Suya have learned something - even something visual such as a weaving pattern - they say, 'It is in my ear'' (Seeger 1975:214).

7.7 Conclusion

Our survey of Australian languages has shown that in one large language family there is a consistent pattern of deriving cognitive verbs from 'hear' - both expected cognitive processes like 'understand' and 'heed/obey' and less expected ones like 'think', 'know' and 'remember' (§5). This is in spite of the general patterning of perception verbs in a way that confirms the well-known dominance of 'see' as the source of semantic extensions to other sensory modalities (§4). The trans-field mapping of perception to cognition, it seems, is much more plastic and amenable to different cultural interpretations than the intrafield extensions of perception verbs. We have demonstrated that the same domain can have its 'universal' and 'relativistic' sides; a foot in nature and a foot in culture.

Using evidence from direct extensions (polysemy) and indirect extensions (derivation and heterosemy) we were able to establish clear patterns of intrafield and trans-field change for the Australian region. As far as 'hear' and 'see' are concerned, these patterns of change are replicated by extensions involving 'ear' and 'eye' respectively. For instance, while 'hear' and 'ear' most commonly have trans-field extensions to "intellection at large", 'see' and 'eye' tend to remain removed from the domain of cognition and instead typically have transfield extensions into the domain of "social interaction". The extreme robustness of our findings was revealed by showing, in §6, that the same patterns of semantic association are also found in other semiotic systems beyond everyday language (i.e., respect registers, initiation registers and sign language). Furthermore the accumulated data is sufficient to show that the culturally-influenced trans-field semantic developments are not arbitrary: within a given culture area it is possible to find large numbers of parallel developments, and also to formulate implicational claims, such as the impossibility of 'hear' developing to 'know' without also taking on an 'understand' (or think) sense.

While we have shown that Australian languages differ from Indo-European in their pathways of semantic development, it is less clear what the causes are. We have cited suggestive ethnographic evidence on the prevalence of the ear as the metaphorical organ of cognition, the increased importance of selective attention making hearing a more conscious process, and the existence of cultural scripts that facilitate particular tropes, but this falls short of a complete explanatory account. To gain a more satisfactory understanding of what causes such different pathways of semantic development in two different cultures we must ultimately develop more sophisticated ways of documenting contrasts in cultural scripts, and better means of predicting when particular pragmatic extensions will be lexicalized. We also need, for Australian languages, much larger textual corpora that will allow us to assess how often particular bridging contexts occur, and to give us a finer grain on what precise contexts license particular extensions. Only when we possess real in-depth studies of the interaction of cultural scripts and the pragmatics of semantic extension will we be able to provide truly falsibiable hypotheses accounting for the contrasting patterns that emerge from typological studies like the one reported here.

Abbreviations for languages:

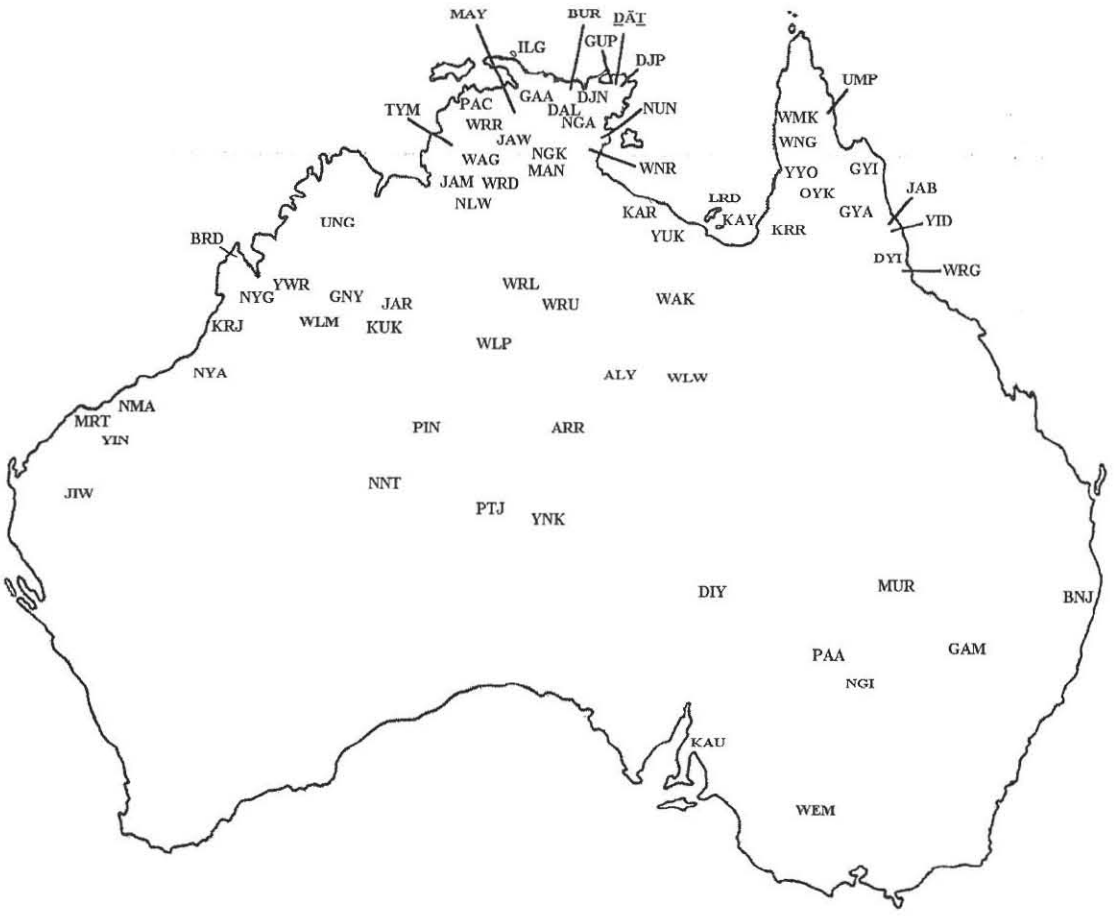
A Arrernte (Wilkins field notes; Wilkins 1989; Henderson and Dobson 1994)
D Dalabon (Evans field notes)
G Gooniyandi (McGregor 1990)
I Kuninjku (Eastern dialect of Mayali) (Garde 1995, Evans field notes)
K Kayardild (Evans 1992b, 1995, field notes)
Kuk Kukatja (Valiquette 1993)
L Lardil (Ngakulmungan Kangka Leman 1997)
M Mayali (Evans 1991, field notes)
Ngal Ngalakan (Merlan 1983)
P/Y Pitjantjatjara/Yankunytjatjara (Goddard 1994)
Ty Tyemeri (aka Ngan.gityemeri) (Nicholas Reid p.c.)
W Warlpiri (Laughren 1992, p.c.)
Y Yidiny (Dixon 1991)
YY Yir-Yoront (Alpher 1991)
KYal Kuku Yalanji (Oates 1992)
WNg Wik Ngathan (Sutton 1995)

Glosses:

ABL	Ablative
ABS	Absolutive
ACC	Accusative
BEN	Benefactive
COMP	Complementizer
CONT	Continuous
CS	Changed state
DS	Different Subject
EMPH	Emphatic
ERG	Ergative
exc	exclusive
F	Future
GEN	Genitive
IMP	Imperative
INCH	Inchoative
IRR	Irrealis
ITER	Iterative
LOC	Locative
NEG	Negative
NEG.ACT	Negative actual
NF	Non future
NOM	Nominative
NOMZR	Nominalizer
NP	Non past
OBJ	Object
PASS	Passive
PI	Past Imperfective
pl	plural
PC	Past completive
PP	Past Perfective
PRES	Present
PST	Past
REDUP	Reduplication
REFL	Reflexive
REL	Relative
REP	Repetition
RR	Reflexive/reciprocal
SBSQT	Subsequent
SEMBL	Semblative
SEQ	Sequential
sg	singular
SUB	Subordinate
SUBJ	Subject

Roman numerals I to IV refer to noun classes in Mayali and Kuninjku.
Arabic numerals refer to person values; divalent prefixes of the form 1/3 mean 'first person acting upon third person', with the number to be understood as singular unless otherwise marked.

Map: Languages in the sample



Sources and key to language abbreviations on map

LANGUAGES MENTIONED IN TEXT	Abbreviation used on map	Sources Used
Arrernte (Eastern and Mparntwe/ Central dialects)	ARR	Wilkins 1988, 1989, fieldnotes; Van Valin and Wilkins 1993; Henderson and Dobson 1994
Alyawarr	ALY	Green 1992; Yallop 1977;Wilkins fieldnotes
Bandjalang	BNJ	Crowley 1976, Sharpe 1994
Bardi	BRD	Worms 1942; McGregor (pc)
Burarra	BUR	Glasgow 1994
Dalabon	DAL	Evans field notes
Dätiwuy	DĀT	Ganambarr 1994
Demiin [Initiation register]	see Lardil	Hale 1982; Evans 1992a; Hale and Nash 1997
Diyari	DIY	Austin 1981; 1994
Djabugay	JAB	Patz 1991
Djapu	DJP	Morphy 1983
Djinang	DJN	Waters & Waters 1987
Dyirbal	DYI	Dixon 1971; 1972; 1990
Gaagudju	GAA	Harvey 1992
Gamilaraay	GAM	Austin 1993
Gooniyandi	GNY	McGregor 1989, 1990, 1994, (pc)
Gugu Yalanji [Kuku-	GYA	Oates 1992a

Yalanji]		
Gun-djeihmi [dialect of Mayali]	see Mayali	Evans 1991, field notes
Gupapuyngu	GUP	Zorc 1986
Guugu Thabul (respect register)	see Guugu Yimithirr	
Guugu Yimithirr	GYI	Haviland 1979a,b;c; ms.
Ilgar	ILG	Evans field notes
Jalnguy [respect register]	see Dyirbal	
Jaminjung	JAM	Schultze-Berndt in prep ; pc
Jaru	JAR	Tsunoda 1981
Jawoyn	JAW	Merlan n.d.
Jiliwirri [initiation register]	see Warlpiri	Hale 1971
Jiwarli	JIW	Austin 1992
Karajarri [Garadyare]	KRJ	Worms 1942;
Kaurna	KAU	Amery and Simpson 1994
Kayardild	KAY	Evans 1995, fieldnotes
Kriol		Evans (fieldnotes)
Kukatja	KUK	Valiquette 1993; Peile 1997
Kun-kurrng [respect register of Mayali]		Garde 1997, Evans field notes
Kune [dialect of Mayali]	see Mayali	Evans field notes
Kuninjku [dialect of Mayali]	see Mayali	Garde 1997, Evans field notes
Kurtjar	KRR	Black et al 1986
Lardil	LRD	Ngakulmungan Kangka Leman 1997
Mangarayi	MAN	Merlan 1982
Martuthunira	MRT	Dench 1995
Mayali	MAY	Evans 1991, field notes
Muruwari	MUR	Oates 1992b
Ngaanyatjarra	NNT	Douglas 1988
Ngalakan	NGK	Merlan 1983
Ngaliwurru	NLW	Schultze-Berndt pc
Ngandi	NGA	Heath 1978
Ngan.gityemeri (=Tyemeri)	TYM	Reid p.c.
Ngarluma	NMA	O'Grady 1966; 1979; 1990; Hale 1990
Ngiyampaa	NGI	Donaldson 1980, 1994
Nunggubuyu	NUN	Heath 1982; 1984
Nyangumarta	NYA	O'Grady ms.; 1979; 1990
Nyigina (Nyegena)	NYG	Worms 1942;
Oykangand	OYK	Sommer 1973; 1978
Paakantyi (Baagandji)	PAA	Hercus 1982, 1994a
Paccamalh	PAC	Evans field notes
Pintupi/Luritja	PIN	Hansen and Hansen 1992
Pitjantjatjara	PTJ	Goddard 1992; Eckert and Hudson 1988
Tyemeri	see Ngan.gityemeri	
Umpila	UMP	Harris and O'Grady 1976
Ungarinyin [Ungarinjin]	UNG	Coate and Elkin 1974; Rumsey 1982
Wagiman	WAG	Wilson 1997
Wakaya	WAK	Breen pc
Walmajarri	WLM	Richards and Hudson 1990
Wardaman	WRD	Merlan 1994
Warlmanpa	WRL	Nash and Hale ms.; Menning and Nash 1981
Warlpiri	WLP	Laughren 1992; Hale and IAD 1990; Warlpiri Lexicon Project ms.; Nash 1986

Warluwarra	WLW	Menning and Nash 1981
Warndarang	WNR	Heath 1980
Warray	WRR	Harvey 1986
Warrgamay	WRG	Dixon 1981
Warumungu	WRU	Menning and Nash 1981; Simpson and Heath 1982
Watjarri	WTJ	Douglas 1981
Wemba-Wemba	WEM	Hercus 1992, 1994b
Western Desert	(see Kukatja, Ngaanyatjara, Pintupi/ Luritja, Pitjantjatjara and Yankunytjatjara)	Douglas 1977, 1988
Wik-Mungkan	WMK	Kilham et. al 1986
Wik-Ngathan	WNG	Sutton 1995
Yankunytjatjara	YNK	Goddard 1983; 1992; 1994
Yawurru (Yaoro)	YWR	Worms 1942
Yidiny	YID	Dixon 1977; 1991
Yinyjiparnti	YIN	O'Grady 1966, Wordick 1982; Smythe and Thieberger 1994
Yir Yoront	YYO	Alpher 1991
Yukulta	YUK	Keen 1983

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Von 1968 an erschienen die von Prof. Dr. Hansjakob Seiler herausgegebenen Arbeitspapiere des Instituts für Sprachwissenschaft. Nach der Emeritierung von Prof. Dr. Seiler im März 1986 wurde eine neue Folge mit neuer Zählung und dem Zusatz "Neue Folge" (N. F.) begonnen. Herausgeber ist das Institut für Sprachwissenschaft.

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The knowing ear:
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The knowing ear: An Australian test of universal claims about the semantic structure of sensory verbs and their extension into the domain of cognition.

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Milyilyi-lu kulirninpa, langa kulirninpa-lu
brain-ERG hear/think, ear hear-at him/her
'Our brain thinks/hears, our ears think/hear' [Kukatja, from Peile 1997]

1 Introduction[1]

In this paper we test previous claims concerning the universality of patterns of polysemy and semantic change in perception verbs. Implicit in such claims are two elements: firstly, that the sharing of two related senses A and B by a given form is cross-linguistically widespread, and matched by a complementary lack of some rival polysemy, and secondly that the explanation for the ubiquity of a given pattern of polysemy is ultimately rooted in our shared human cognitive make-up. However, in comparison to the vigorous testing of claimed universals that has occurred in phonology, syntax and even basic lexical meaning, there has been little attempt to test proposed universals of semantic extension against a detailed areal study of non-European languages.

To address this problem we examine a broad range of Australian languages to evaluate two hypothesized universals: one by Viberg (1984), concerning patterns of semantic extension across sensory modalities within the domain of perception verbs (i.e. intra-field extensions), and the other by Sweetser (1990), concerning the mapping of perception to cognition (i.e. trans-field extensions). Testing against the Australian data allows one claimed universal to survive, but demolishes the other, even though both assign primacy to vision among the senses.

On the basis of a crosslinguistic typological study, Viberg (1984) reports a universal hierarchy of perception verbs, with vision at the top, and a unidirectional tendency of semantic change which works in accordance with the hierarchy. Our paper extends his study to Australian languages and confirms his findings.

Sweetser (1990), predominantly on the basis of Indo-European data, argues that "the objective, intellectual side of our mental life seems to be regularly linked with the sense of vision" (1990:37), whereas "hearing is connected with the specifically communicative aspects of understanding, rather than with intellection at large", and "it would be a novelty for a verb meaning to 'hear' to develop a usage meaning 'know' rather than 'understand',

[1] Much of the collaborative work enabling this paper to be written was undertaken while Evans was a visiting fellow at MPI Nijmegen. Evans wishes to thank the University of Melbourne for study leave to work in Nijmegen, MPI Nijmegen for furnishing an ideal work environment for addressing these problems, the Alexander von Humboldt-Stiftung for supporting his writing up of related work on Mayali in 1997-8, and the Australian Research Council (Large Grant: Polysemy and Semantic Change in Australian Languages) for its financial support. Wilkins would like to thank the Max Planck Society for the funding of annual field trips in the period 1992-1997. Earlier versions of the paper were presented at the Institut für Sprachwissenschaft, U. Köln; the Department of Linguistics, University of New England, U.C. Berkeley, the Department of Linguistics & Applied Linguistics, U. Melbourne; we thank participants in those seminars for their useful comments. We are also grateful to Felix Ameka, Melissa Bowermann, Gavan Breen, Eve Danziger, Bob Dixon, Murray Garde, Cliff Goddard, Jean Harkins, John Haviland, Penny Johnson, Mary Laughren, Steve Levinson, Bill McGregor, Andrew Mirtschin, David Nash, Nick Reid, Eva Schultze-Berndt, Eve Sweetser and Anna Wierzbicka for useful discussions, comments and data. Most importantly we wish to thank the speakers who have taught us about various Australian languages mentioned here: the Arrernte speakers affiliated with the Yipirinya School and Intelyape-lyape Akaltye project in Alice Springs (esp. Margaret Heffernan); Netta Loogatha, Darwin Moodonuthi, and Paula Paul (Kayardild); Alice Bohm and Jack Chadum (Dalabon), David Karlbuma (Dalabon and Kune), Toby Gangele (Mayali), and Mick Kubarkku (Kuninjku).

whereas such a usage is common for verbs meaning 'see'" (1990:43). But as we shall demonstrate, Australian languages regularly recruit verbs of cognition like 'think' and 'know' from 'hear' rather than 'see', supporting a more plastic and relativist view of the relation between perception and cognition.

This leaves us with a seeming paradox that, in Australian languages, vision both is and isn't the privileged modality in the lexical field of sensory verbs. This paradox is resolved if one accepts that the trans-field figurative projection of sense verbs into the domain of cognition is far more open to cultural variation than intra-field extensions are.

The research discussed in this paper forms part of a wider study of polysemy and semantic change in Australian Aboriginal languages (Evans 1992, 1997, Wilkins 1996, 1997). The broader question we are addressing is the extent to which patterns of polysemy and semantic change are language-independent, or, in contrast, culture- and language-specific. The issue of whether the mapping of perception to cognition is universal or culture-specific is, therefore, one of several case studies which we have undertaken to address this larger issue. Australian languages are particularly interesting and important for the wider study for four main reasons:

> (a) their typological and cultural distance from the Indo-European languages which have informed most work to date on semantic change and polysemy (and more specifically on metaphor).
> (b) the large number of related languages spoken in what is basically a single culture area, allowing us to observe the recurring patterns needed for formulating implicational statements with a fine grain.
> (c) the extensive cultural continuity and persistence of a hunter-gatherer economy on the Australian continent, which means that current systems are likely to be much closer to those in reconstructable language phases than is the case for, say, Indo-European.
> (d) the existence of indigenous traditions of auxiliary semiotic systems (e.g. respect registers, special initiation registers, sign languages), usually employing superordinate or hyperpolysemous terms that illustrate wider semantic links .

Our guiding hypothesis in this broader comparative study is that some semantic fields will be prone to more cross-linguistically divergent patterns of polysemy and semantic change than others, making the typological study of polysemy a key method for studying the areas in which the human mind is most subject to moulding by culture. The case of perception lexemes and their semantic extension is of interest, because it seems, pretheoretically, to involve both neuro-physiological givens (e.g. the structure and experience of basic perception) and cultural variables (e.g. the cultural foundations of metaphor and metonymy, and the classification and evaluation of knowledge).

The paper is organized as follows. In §2, we briefly examine three approaches to the crosslinguistic investigation of semantic extensions involving perception verbs. In §3, we present our own background theoretical assumptions with respect to the study of polysemy and semantic change and we review the type of data and methods we have used. The linguistic attributes of perception verbs in Australian languages will be discussed in §4, as will our findings concerning cross-sensory polysemy and semantic change within that semantic field. We then move on to discuss the Australian patterns of extension from perception to cognition in §5. While most of our data is drawn from everyday language registers, in §6 we show how data from other semiotic systems used in Australian communities recapitulates the findings in the two previous sections. Finally, in §7, we examine a number of social and cultural factors which help to explain why the pattern of extension from perception to cognition in Australian languages is so divergent from that in Indo-European languages.

2 Three research traditions concerning perception verbs

A primary reason for pursuing research into perception verbs and their patterns of semantic extension is that incompatible claims have been advanced with respect to this domain by investigators within three research traditions. Curiously, these three traditions have remained insulated from one another, with a total absence of cross-citation.

The first research tradition involves the typological study of lexicalization patterns across perceptual modalities within the semantic field of sensory (perception) predicates. Viberg (1981, 1984) found a unidirectional path for semantic extensions across the senses, proceeding downwards from vision: 'see' can develop the secondary meaning 'hear' or 'smell', for example, but never the reverse. We will return to these claims in more detail below (in §4); for the moment we merely observe that Viberg's findings, like the studies of colour terms by Berlin and Kay (1969), could be formulated as virtually exceptionless implicational universals of semantic extension across a broad cross-linguistic sample.

In the second tradition, scholars like Sweetser (1990) who take a cognitive linguistic approach have made clearly universalizing proposals (though admitting their evidence is confined to Indo-European languages) about the primacy of vision as the sensory modality used for metaphors of knowledge and thought. We have already outlined Sweetser's position briefly in the introduction, but two more complete quotes from her influential study illustrate this position more fully:

> The objective, intellectual side of our mental life seems to be regularly linked with the sense of vision, although other senses .. occasionally take on intellectual meanings as well. There are major similarities in our general linguistic treatments of vision and intellection. (Sweetser 1990:37)

> ... it is probably the case, then, that hearing is universally connected with the internal as well as the external aspects of speech reception. Inasmuch as speech is the communication of information or of other matter for the intellect, hearing as well as sight is connected with intellectual processing..... But hearing is connected with the specifically communicative aspects of understanding, rather than with intellection at large. (Sweetser 1990:43)

By contrast, recent studies within the third tradition — 'the anthropology of the senses' — emphasize (i) the degree to which different cultures weight the relative importance of sensory modalities differently, (ii) the range of cultural variation in the conscious use of, and appeal to, sensory modalities, and (iii) the culture-specific patterns of sensory symbolics, including different patterns in the linking of specific-sensory modalities with specific cognitive states. A recent book in this tradition, edited by Howes (1991), approvingly cites Ong's (1967) seminal article:

> Cultures vary greatly in their exploitation of the various senses and in the way in which they relate their conceptual apparatus to the various senses. It has been a commonplace that the ancient Hebrews and the ancient Greeks differed in the value they set on the auditory. The Hebrews tended to think of understanding as a kind of hearing, whereas the Greeks thought of it more as a kind of seeing, although far less exclusively as seeing than post-Cartesian Western man generally has tended to do. (Ong 1991 [1967]:26-7)

A number of ethnographic and comparative studies in this research tradition make similar claims, which are clearly at odds with the "vision-is-primary universalist" position associated with both Viberg's and Sweetser's research. Consider the following quotes:

> It was stressed to me that one cannot 'see' the motives, thoughts or intentions of another [in Ommura - N.E. & D.W.]. They are 'inside the ear'. As elsewhere in Papua New Guinea, intellectual processes, knowledge and

> memory are associated with the ear. The same verb 'iero' is used to mean 'to hear (a sound) and 'to know' or 'to understand'. (Mayer 1982:246)
>
> The Hausa word *gani* means 'to see.' One of the points about which my Hausa teacher, Mallam Garba Adamu, was insistent is that this word only means 'to see'. It is never used in the sense of understanding what a person means. (Ritchie 1991)
>
> The Tzotzil, the Ongee and the Desana each conceptualize the vital force of the cosmos in terms of a different sensory energy. ... In each of these cultures putting the cosmos in order ... involves putting the senses in order. ... The three cultures examined here can all be classified as oral cultures with regards to their dominant medium of communication, yet they are not all aural cultures. The Tozotzil symbolically orient themselves by temperature, the Ongee by smell. The colour-minded Desana, appear at first sight, to be as visualist as the West. (Classen 1993:135)

Another anthropological approach to perception which shares the relativistic stance of the "anthropologists of the senses", but emphasises the role of environmental, as opposed to strictly social, factors, is exemplified by the work of Gell (1995) and Feld (1990, 1996) and is rooted in the phenomenological tradition of Merleau-Ponty (1962, 1964). Based on ethnographic fieldwork in Papua New Guinea these authors, especially Gell, argue for a form of environmental determinism in the shaping, ordering and symbolic mapping of perceptions. Very roughly, this position claims that the environment a speech community inhabits (e.g. dense jungle versus open desert) will give differential access, in terms of strength and frequency, to various perceptual stimuli and as a result not only will different sensory modalities be dominant for the coding of the environment as a whole, but the whole nature of perceptual experience will be differently structured. These differences will then have consequences for the structuring of symbolic behaviour and everyday social interaction.

In contrasting these three traditions, it must be emphasised that Viberg, like Berlin and Kay (1969), investigated associations within one coherent semantic domain. In Matisoff's (1978) terms, the semantic changes investigated were all intra-field changes (i.e. both the original and extended meaning are in the same semantic field). However, the point of contention between researchers like Sweetser and the 'anthropologists of the senses' concerns trans-field associations in which perception is mapped to cognition. Thus, there are two separate issues to be considered: (1) within the field of perception verbs, do intra-field semantic associations in Australian languages reveal the same hierarchical ordering of perceptions (with 'see' at the top)? and (2) as far as extensions from perception to cognition are concerned, do Australian languages show a typical trans-field mapping of 'see' to 'know' (and to intellection at large) and 'hear' to 'understand' (and to basic internal 'speech' reception)?

In sum, then, the 'anthropologists of the senses' would predict that the Australian data should reveal cultural variation both with respect to hierarchical ordering of perceptions and with respect to trans-field mapping of perception to cognition. The cognitive linguistic position represented by Sweetser would predict that the Australian patterns of extension from perception to cognition will represent the "universal" patterns discovered on the basis of primarily Indo-European languages, and since this pattern would, from an experiential body-centered view, arise naturally from the universal hierarchical ordering of perceptions proposed by Viberg (with a verb higher on the perception hierarchy mapping to 'higher' cognition verbs indicating greater certainty), the same hierarchy should also be found in the Australian data. While others have read similar predictions into Viberg's findings, he himself has taken a more agnostic position: that "[a]t the presentation of this paper at Cascais, Paul Kay suggested ... that the hierarchy of polysemy would also predict which cognitive meanings would be assumed by the verbs of perception. A verb higher up in the hierarchy will tend to assume a cognitive meaning that expresses a higher degree of certainty. Unfortunately, I have not been in a position to check this idea systematically." (Viberg 1984:157-8); he goes on to say that we cannot determine whether

universal patterns exist "as long as there are no systematic data from a controlled sample" (Viberg 1984:158).

In the study that follows, we will show that patterns of extension of sensory verbs across perceptual modalities basically follow Viberg's law, with vision primary. On the other hand, the extension of verbs from perceptual to cognitive meanings is quite different from the Indo-European-based pattern studied by Sweetser: it is hearing, not vision, which regularly extends into the cognitive domain[2], going beyond the expected extension of 'hear' to 'understand', and on to 'know', 'think', 'remember' and other cognitive verbs; 'see' only extends rarely to cognitive verbs, and is more likely to extend to verbs for various sorts of social interaction ('flirt with', 'love', 'supervise/oversee'). Overall, then, our findings support a universalist position for strictly sensory verbs (i.e. the intra-field changes), but a culturalist position for their extension into the cognitive domain (i.e. trans-field changes).

3 Polysemy and semantic change: some assumptions and methods

It has become a standard assumption that semantic change from meaning A to B normally involves a transitional phase of polysemy where a form has both meanings (Wilkins 1981, 1996; Sweetser 1990, Heine 1997:82). What is articulated less often is that this phase of polysemy (i.e., what Heine calls the stage of overlap) is typically preceded by a phase where meaning B is only contextually implicated but not yet lexicalized as a distinct sense (cf. Traugott 1989). That is to say, meaning B often comes into existence because a regularly occurring context supports an inference-driven contextual enrichment of A to B. In these contexts, which we term *bridging contexts*, speech participants do not detect any problem of different assignments of meaning to the form because both speaker and addressee interepretations of the utterance in context are effectively, functionally equivalent (if semantically distinct). Subsequently this contextual sense may become lexicalized to the point where it need no longer be supported by a given context.

We are particularly interested in the pragmatics of 'bridging contexts' because we assume that this is where both universal and culture-specific factors actually drive semantic extension in contexts of interaction. In exploring bridging contexts, the primary question is: what recurrent contexts, and what cultural scripts, allow particular pragmatic extensions to occur with sufficient frequency that they get lexicalized as distinct, but related, meanings of a form? To answer this question we apply two methods of investigation. The first is to follow the classic philologist's approach and search for a textual context in which 'ces deux sens recouvrent leur unité' (Benveniste 1966:290). This entails a close attention both to textual occurrences of the verbs we are dealing with and to the sorts of image schemas that have become well-known in work on metaphor (e.g. Lakoff & Johnson 1980). The second approach is essentially anthropological and requires us to explore cultural contexts of use and articulate rules of pragmatic inference which make reference to particular cultural scripts. As Keesing (1979:27) has noted, "[p]ragmatic rules ... assume .. more general assumptions about the social and cultural universe without which they would be meaningless". Such cultural scripts will be invoked at the end of this paper, when we discuss why 'hear' rather than 'see' should give rise to cognitive verbs in Australian languages.

As an example, one important bridging context in the extension of 'hear' to 'recall, know, think about' is the context in many Australian Aboriginal narratives where travellers "hear the places" or "hear the way" in their travels, in the sense of hearing in their heads the recalled names of places along a route that had been sung or recounted to them previously; we discuss this in more detail in §5.3.5 and §7.4. To furnish examples of such a bridging context we need a good text corpus, and to make sense of it we must invoke both cultural scripts about the imparting of route knowledge (i.e. 'knowing a place

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[2] We are not the first to make this observation. Hercus (1992: 42), for example, remarks with respect to the Wemba-Wemba verb *nyernda* 'to know, to understand', formally related to *nyerna* 'to sit, to listen, to hear, to remember': 'This derivation, implying that 'hearing is knowing' is common in Australian languages and contrasts with the Indo-European method of expression 'I have seen', 'I know'.

and its location' means 'having heard the relevant songs and stories for that place') and general pragmatic rules for metonymically interpreting 'hear the place' as 'hear the name of the place'.

The relevant point for present purposes is that to understand semantic change we must focus on polysemy. Insistence on synchronic attestation of polysemy places strong constraints on postulated semantic changes, providing an important antidote to the unbridled imagination in discussing semantic change, while at the same time allowing us to place change under the microscope through the close study of lexical items in text and context. Through focusing on text and context one attempts to describe (or reconstruct) bridging contexts, the places where extended meanings commonly have their genesis, but to do this one must have sufficient information on cultural scripts and rules of pragmatic implicature.

A consequence of the above position is that different patterns of synchronic polysemy will engender different diachronic pathways of semantic change, and conversely that different pathways of semantic change reflect different patterns of polysemy in earlier *états de langue*. Universal patterns of semantic change should lead to very similar patterns of polysemy cross-linguistically, and forms with meanings that arise from such universal pathways should have comparable etymologies. On the other hand, crosslinguistically distinct polysemies will generate dissimilar semantic pathways and etymologies.

The different mappings of 'see' and 'hear' onto cognitive verbs in Australian and Indo-European languages, to be examined in detail later in the paper, are reflected in quite different etymologies between the two families. Fig. 1, based on materials in Sweetser 1990, illustrates the development of pIE *weid- 'see', whose reflexes retain their visual meaning in Slavic and Romance, but change to meanings associated with knowledge in Greek, Germanic and Celtic:

PIE *WEID- 'SEE': Greek: *eidon* 'see', perf. *oida* 'know' > Eng. *idea* Dutch: *weten* 'know' German: *wissen* 'know' Russian: *videt'* 'see' English: *wise*, *wit* Latin: *video* 'see'; Italian: *vedere* 'see'. Irish: *fios* 'knowledge'

Fig. 1. Some developments of pIE *weid- 'see' (After Sweetser 1990)

In contrast, the 'see' verb reconstructable for proto-Australian as **na-* (with development to **NHaa-* in proto-Pama-Nyungan - Evans 1988) only has a clear development to 'know' in one language in the extreme south, Kaurna; the development to 'think' in Guugu Yimidhirr may be mediated by the 'hear' meaning it also develops. Elsewhere **na-* retains its visual sense or develops in the direction of such meanings as 'find'[3]:

[3] Sources for the languages cited, and their geographical locations on the continent, are given at the end of this paper.

proto-Australian[4] *na- 'see, look at'.		
non-Pama-Nyungan languages:		
Paccamalh:	*na-*	'see'
Burarra:	*na-*	'see, look at, read'
Mayali:	*na-*	'see, look at'
Dalabon:	*na-*	'see, look at'
Nunggubuyu:	*na-*	'see'
proto-Pama-Nyungan *NHaa- 'see, look at'		
Yidiny:	*nyaki-* 'look at, see'	
Guugu Yimithirr:	*nhaamaa* 'see, look, hear, **think**'	
Gugu Yalanji:	*nyajil* 'perceive, hear, see'	
Jiwarli:	*nhanyangku* 'to see, to look, to look at, to watch'	
Ngarluma:	*nhaku(-ku)* 'to see'	
Pitjantjatjara:	*nyanganyi* 'see, watch, look at, find'	
Warlpiri:	*nyangu* 'see; to watch; look at; perceive; determine; find out'	
Jaru:	*nyangan* 'to see, watch'	
Kukatja:	*nya-* 'to see, look at, watch; look for; diagnose'	
Warumungu:	*nya-* 'to see, look at, to look for, search for'	
Muruwari:	*nha-* 'to see, look at, observe'	
Kaurna:	*nakkondi* ''to see, look; to **know**'	
Djinang:	*nyangi* 'see; observe; read; perceive; shine; inspect'	

Fig. 2. Cognates of pA *na- 'see, look' and proto-Pama-Nyungan *NHaa- 'see, look'.

It appears that 'hear' never develops 'know' or 'think' meanings in Indo-European, though it sometimes develops to 'obey' (Danish) or 'attend to' (Swedish). For instance, Classen (1993:59) writes:

> Significantly, auditory terms rarely serve as metaphors for thought or intelligence in English. ... This is perhaps because hearing is conceived of as a passive sense, receiving information but not probing it. Therefore, rather than being associated with intelligence, hearing is associated with obedience. The word obedience, indeed, is derived from the Lautin audire to hear. So if hear is to obey, to obey is also to hear.

Figure 3 shows the etymological set for pIE * k^leu-, * k^leu-s- 'hear'.

C.Greek:	*klúo* 'hear', *kléos* 'report, fame, glory'
Old Church Slavic:	*slovo* 'word'
Latin:	*clue:re* 'be called, be famous'
Welsh:	*clywed* 'hear'; Breton: *klevout* 'hear'
Gothic:	*hliuma* 'hearing'
Old Danish	*lytte* 'listen; Modern Danish *lyde* 'obey'
Old English	*hlu:d* 'loud'; Dutch *geluid* 'loud'
Old English	*hlyst* 'hearing' > OE *hlystan* > Modern English *listen*
Swedish	*lystra* 'attend to', Danish *lystre* 'obey'

Fig. 3. Developments of pIE * k^leu-, * k^leu-s- 'hear' (data from Buck 1949)

Although there are many individual examples in Australia where 'hear' extends to 'think' and 'know' (see §5.3), we have not yet identified a 'hear' etymon with wide attestation in Australia, and so cannot show a fully comparable etymological set

[4] In fact this root may not be attributable right back to proto-Australian, since it is absent from all Western non-Pama-Nyungan languages: it is not found in any languages of the Kimberley, or of the Daly region (except Paccamalh, which has more easterly genetic affiliations).

demonstrating the different pattern of extension. However, examination of proto-Pama-Nyungan **pina* 'ear' and its derivatives, which are often verbs meaning 'hear/listen', illustrates the frequency with which these cognitive meanings develop across the etymological set. See Figure 4.

Ngaanyatjarra: *pina* 'ear'; Gamilaraay: *pina* 'ear'; Warrgamay *pina* 'ear'; Bandjalang *pinang* 'ear', etc.	
Yidiny:	*pina* 'ear'; *pina-N* 'hear; listen to; **think about**; **remember**'
Muruwarri:	*pinathina-* to hear; to listen to
Guugu Yimidhirr:	*pinaal* (adj.) 'smart, clever, **know**' ;
Gugu Yalanji:	*pinal* 'to **know**'
Nyangumarta:	*pina karri-nyi* [lit. 'ear-stood'] 'he heard it, he understood it, he obeyed him, (of cold air); he felt it'
Warlpiri:	*pina* 'wise; **knowing**; experienced'; *pinarri* 'wise; **knowledgeable**; smart; *pina-wangu* [~-without] '**ignorant**'; *pina(pina)(ri)-jarrimi* 'to learn'; *pina(pina)-mani* 'to teach'
Jaru	*pina yungan* [lit. ear put] 'to learn', *pinarri* '**knowing**'
Gooniyandi[5]	*pinarri* '**know**; **knowledgeable**'
Warumungu	*pina-* 'to hear, listen to, understand'

Fig. 4. proto Pama-Nyungan *pina 'ear' and some of its derivatives. [6]

Our discussion of 'bridging contexts' above predicts that such systematically different patternings in polysemy and etymology would reflect differences in cultural traditions. Here we face the broader task of gathering, and contextualizing, attestations in different languages and language areas; this is particularly important for typological work which depends on a large data base to show recurrent regularities and implicational relationships. We know from studies of other lexical domains that polysemy exhibits strong areal patterning in Australia - sometimes at the level of the whole continent as opposed to elsewhere in the world, and sometimes at more local levels, such as the Lake Eyre Region (Austin, Ellis & Hercus 1976) or the Cairns Rainforest (Sear 1995). Where relevant we will discuss the areal distribution of patterns, to avoid the pitfall of projecting an 'Australian pattern' which may in fact be more local. Nonetheless, it turns out that most of the patterns we discuss in this paper are Australia-wide rather than being found in specific areas, except for the 'see - hear' polysemy which is largely confined to Cape York.

One important caveat must be made here: the distribution of good lexicographic, ethnographic, and textual materials is far from uniform, partly reflecting the chronology of white impact on Australia (with the southern regions poorly represented due to early language loss) and partly reflecting local research traditions. For instance, we currently have half a dozen good published dictionaries for Central Australia, but only one for the Kimberley region and none for the Daly (cf Goddard & Thieberger 1997). The potential of this skewing to produce spurious areal patterns must be borne in mind.

As well as examining patterns of polysemy, we will also investigate semantic extensions accompanying derivation, such as change of gender or reduplication. Strictly speaking this is heterosemy (Lichtenberk 1991) - a relation in which related (often identical) forms and their different, but related, senses belong to different morphosyntactically-determined grammatical categories. In polysemy, there is one lexeme with several related senses, in heterosemy there are two or more related lexemes each with a sense that clearly shows semantic affinity. As an example of "pure" (zero or underived)

[5] This is the only non--Pama-Nyungan language in the set; it is possible that *pinarri* is a loan from the neighbouring Pama-Nyungan language Jaru.

[6] Since the vast majority of Australian languages do not have a voicing distinction in stops, we have given all the forms in this table with an initial 'p', even though in the orthographic conventions of some of the languages the words might actually be written with a 'b'.

heterosemy, we find in Yidiny (Dixon: 1991) that the root *bina* as a nominal means 'ear; gill on fish', but as a particle it means 'I thought something was the case, but it is not'. In addition there is a verb *bina* (in the N-conjugation) which means 'hear; listen to; think about; remember'. Similarly, in Jiwarli (Austin 1991), *kurlga* as a nominal means 'ear' but as a particle it means 'remember'. Although some semanticists (e.g. Lehrer 1990) extend polysemy to cover such situations, in principle one should track polysemy independently of heterosemy. But our reason for including such evidence here is that time and again we find parallels where one language's polysemy is another language's heterosemy. Consider the following semantic extension of 'eye', which is heterosemous in the Gun-djeihmi dialect of Mayali, but polysemous in the Kune dialect (which lacks noun class distinctions).

	Gun-djeihmi	Kune
'eye'	*gun-mim* [*gun-* is neuter prefix]	*mim-no*
'fruit, seed'	*an-mim* [*an-* is vegetable prefix]	*mim-no*

Figure 5: Heterosemy (in Gun-djeihmi) vs. Polysemy (in Kune)

Examples of such parallelisms could be multiplied at length (see Evans 1997 for further examples from the domain of animal/plant metonymies); essentially one can see the use of gender prefixes here as making explicit the domain within which a particular metaphorical extension is to be sought, e.g, the domain of plants for 'fruit, seed' (i.e. think of something 'eye'-like in the domain of plants); a language that has polysemy *sensu stricto* simply leaves the corresponding domains implicit.

In the present study we will encounter four main formal patterns of derivation.[9]

Firstly, reflexives and other detransitivized forms of verbs are used to derive both one perceptual sense from another (preeminently 'feel' from 'hear') and cognitive senses from perceptual ones (especially 'think' from 'hear'). An example is Yukulta *marrija* 'to listen, hear', whose reflexivized form *marriija* means both 'to feel' and 'to think'.

Secondly, reduplication is often used to derive cognitive senses from perceptual ones (e.g. 'think' from 'hear'), as well as indicating duration of perception, which may implicate agentivity (see the discussion in §4.1.1 of reduplicated senses of 'hear' in Dalabon, which may implicate 'listen' via the general sense of 'hear over a long time').

Thirdly, incorporation or collocation of nouns is a frequent device for shifting sense modality, e.g. 'see a smell' or 'smell-see' for 'smell', or 'hear a taste' or 'taste-hear' for 'taste'; note that accommodation of the perceptual modality of the lexical verb must be made anyway in order to account for the interpretability of the resultant predicate.

Finally, compounds or coverbal constructions such as 'eat smell' for 'taste' may be used. Here it is less clear that the semantic extension resides in the verb rather than being added by the compounding element or coverb. For instance, with respect to the Arrernte cognition terms *ite-le-areme* (throat-INSTR-see) 'know; realise; remember; think; decide' and *irlpe-angkeme* (ear-speak) 'remember', which are historically compounds, it is unclear whether we are dealing with a semantic extension of just one element or of both elements in the compound, or of the unified compound itself (cf. Van Valin and Wilkins 1993:518-527).

Although the bulk of the data we present in §4 and §5 comes from the everyday speech register of Australian languages, in §6 we will demonstrate that the major patterns we have uncovered are recapitulated in other semiotic systems, including respect registers, initiation languages, and auxiliary manual sign languages.

[9] While, theoretically, there are probably good reasons for distinguishing *heterosemy* - meaning differences tied to category differences - from derivational "polysemy" - meaning differences tied to the presence of other signs, in practice it is not always obvious when a marker (like a conjugation class marker) is merely reflecting category status or functioning to derive a root into the category. As such we currently lump heterosemy and derivation together for the purposes of this investigation.

4 Intrafield Polysemy across sensory modalities

In this section we examine intrafield polysemy across the five sensory modalities within the semantic domain of perception verbs; in §5 we turn to trans-field mappings of sensory meanings onto cognitive meanings.

4.1 Viberg's grid of perception verbs

The definitive study of polysemy in the domain of perception verbs is Viberg (1984), a pioneering cross-linguistic survey to which the present study owes a great deal. Viberg's aim was to examine, from a typological point of view, the lexicalization patterns within a specific semantic field. His study examined the results of questionnaire data on perception verbs from "53 languages representing 14 different language stocks from all the major parts of the world" (Viberg 1984:124). No Australian languages were included in that sample, so one aim of this paper is to assess Viberg's claimed universals from the perspective of another language family.[10] We will stick closely to Viberg's own form of discussion, by looking first at the patterns of lexicalization and grammatical treatment within the system of perception verbs in this section (i.e. §4.1) and then at the patterns of verbal polysemy across sensory modalities in §4.2.

Viberg sees a semantic field as being structured by the interaction of field-specific semantic components and general field-independent components that cut across all semantic fields in the same word class (in this case verbs). He writes (1984:122):

> As for the field of perception, the most important field-specific components are the five sense modalities: *sight*, *hearing*, *touch*, *taste*, and *smell*. The most important general components are called *activity*, *experience*, and *copulative*.

Against this background, Viberg begins by setting up a 5 x 3 grid arraying the five main perceptual modalities against three general event type representations of perception: as controlled activity ('she looked at the painting', 'he felt his daughter's brow for signs of fever' etc.), as non-controlled experience ('she saw the painting', 'he felt blood running down inside his shirt'), and as a source-based copulative (state) construction from which the perceiver is omitted ('the painting looked very old', 'his daughter's brow felt feverish'). As is well-known, in English, the activity series allows the progressive in the present but the experience series does not: 'she is looking at the painting', but *'she is seeing the painting'.

In English no verbs are polysemous across sensory modalities, but several are polysemous across two ('look') or all three ('feel', 'taste', 'smell') event types, as shown by Fig. 6:

[10] Viberg did use a few published sources to glean some unsystematic lexical data for a couple of Australian languages, but he did not gather any information on full systems, and does not count such languages in his typological base of 53 languages. He acknowledges (1984:124) that "[a]lthough this is a fairly good sample, it is not satisfactory, since European languages are overrepresented and some areas, such as North and South America and Oceania, are highly underrepresented."

	Activity (Controlled)	Experience (non-controlled)	Source-based copulative (state)
sight	look at	see	look (S.COMP)[11] She looks cold.
hearing	listen to	hear	sound (S.COMP) He sounds tired.
touch	$feel_1$	$feel_2$	$feel_3$ (S.COMP) The wood feels smooth.
taste	$taste_1$	$taste_2$	$taste_3$ (S.COMP) The meat tastes strange.
smell	$smell_1$	$smell_2$	$smell_3$ (S.COMP) She smells soapy.

Figure 6: The Viberg grid for perception verbs.

Needless to say, the above set contains only the most basic verbs, and these may have a considerable number of hyponyms: for instance, 'look at', in English, has the hyponyms 'peer at', 'peep at', 'stare at', 'scrutinize' and many others. Basic perception verbs in Australian languages also often have many hyponyms. Thus, in Kayardild, *kurrija* 'see; look at' has the hyponyms *miburiya ngudija* 'glance at, cast one's eye upon', *walmurrija* 'look up in the sky', *warayija* 'look back', *yarmarutha* 'look down at', *rimarutha* 'look eastwards at' and many others (Evans 1992b:326). Similarly, in Dyirbal, *bural* 'see, look at' has the hyponyms *wabal* 'look up at', *barrmil* 'look back at', *walgiy* 'look over or round something at', *ruygiy* 'look in at', *rugal* 'look at something going past', *wamil* 'look sneakily at, spy on', *ngarnyjay* 'stare at', and some half-a-dozen more (Dixon 1980:106). In the current paper, as in Viberg's, our focus is restricted to the basic set of general superordinate verbs; i.e., what Dixon (1982), on the basis of Australian data, has identified as 'nuclear' (as opposed to 'non-nuclear') verbs (cf. §6).

Another limitation on the data, in our own study as in Viberg's, is the simplifying assumption that there are merely five sensory modalities. In fact, a good case can be made for at least one further modality: proprioception, or internal feeling, as opposed to external touch. This sixth modality is expressed distinctively in many Australian languages. Thus, among the set of basic perception verbs in Arrernte we find *welheme* 'have a (proprioceptive) feeling, feel (cold; sick; hot; etc); feel something doing something to you' This verb is clearly distinct from the verb *anpeme* 'touch; feel by touch; feel (rough; smooth; etc.)'. Historically, the verb *welheme* 'feel (proprioceptive)' appears to have its origins in the reflexive form of the verb 'to hear' (*aweme*). In Warlpiri 'feel (proprioceptively)' is synchronically an extension of 'hear', again using the reflexive, whereas 'feel by touch' uses another verb (§3.2.2). We refrain from adding this sixth modality merely because too few sources discuss it to make a comparative study possible.

We should also mention that in traditional Aboriginal societies there is a widespread belief that certain types of information and knowledge can be gained by extra-sensory perception. Certain powerful individuals may be specially clairvoyant, and any individual may experience premonitions of future events through their dreams. In addition, many Australian languages have a large set of expressions for different types of 'telaesthesia', which Douglas (1977) defines as 'the supposed ability to acquire information about distant happenings or forthcoming events through the interpretation of certain physical disturbances in the body'. Examples from the Western Desert language are *takalarrara* 'crackling in nose indicating the coming of a visitor or event', and *niirnakatira* 'whistling in the ears indicating that elder brother is thinking of the person' (Douglas 1977:5; see also Peile 1997:90-91). From the little evidence that is available, it appears that much of

[11] 'S. COMP' stands here for 'subject complement': the source-based constructions are only grammatical with an overt subject complement, e.g. 'She looks TIRED', 'he sounds DRUNK'. They may take an overt experiencer as an optional NP with 'to X': 'She looks tired to me' or 'To me she looks tired'. In English these two syntactic features are unique to the source-based set and can thus be used to establish the combinatorial distinctiveness of these senses.

the talk surrounding extra-sensory perception is related to basic perception. For instance, in some Australian languages (e.g. Arrernte), dreams, even premonitory dreams, are said to be 'seen' (i.e. described using the basic verb for 'see; look at'). Furthermore, in 'telaesthesia' the basic bodily feeling that makes one aware of a distant happening is often described using the verb of proprioceptive feeling, whereas the overall clairvoyant experience it leads to may be described using a derivative of the verb 'to hear; listen; understand'. For instance, the ninth distinct sense of *kulini* 'hear; listen' given in the *Pitjantjatjara/Yankunytjatara to English Dictionary* (Goddard 1992) is "Have a premonition from a sensation in the body."[12] Similarly, in Kukatja, the term *kulil-kulilpa* 'clairvoyance; insight into some future event; an unusual feeling that something is going to happen' is derived from the verb *kulila* 'hear; listen; understand; think; recognise; obey' (Peile 1997:49; Valiquette 1993).[13] For the moment, we will assume that extra-sensory perceptions are treated as hyponyms of different basic perception verbs, with further semantic components pertaining to particular types of information conveyed. Again because of the paucity of full lexicographical treatments, we do not consider this interesting set further here.

As we shall demonstrate in the discussion which immediately follows, the data itself leads to a more radical form of simplification. In the following section we show that Australian languages systematically fail to make a lexical distinction between the three event types, using constructional differences to make the semantic distinction where necessary: typically, they lexically conflate the activity and experience types (though there are contexts such as imperatives and iterative reduplications in which the activity reading predominates), and use a secondary predicate construction with overt perceiver for the source-based stative set . The following section is therefore an excursus showing how these three event-types are lexically conflated and constructionally distinguished, beginning in §4.1.1 with the distinction between activity and experience senses, and proceeding to source-based senses in §4.1.2; at the end of it we shall be justified in grouping all three types together for each semantic modality.

4.1.1 Activity vs Experience

The lack of a systematic distinction between activity and experience verbs of perception is widespread in Australian languages. Dixon (1979:104-105), in arguing that the uncontrolled (experience) verbs 'see' and hear' tend to be treated grammatically in the same way as their controlled (activity) counterparts, writes:

> Support for this line of argument comes from Australian languages, which have a single verb covering both 'see' and 'look at', and another for 'hear' and 'listen to'. That is, a single lexical root is employed to describe chance or involuntary perception, and also for purposeful directing of attention; in the latter sense, these verbs can of course be used in the imperative form. Almost all Australian languages show this pattern.

The only Australian language we know of that makes a systematic distinction between the activity and experience event types in perception is Paakantyi (see below). In keeping with Dixon's argument, the lack of a lexical distinction between activity and experience types does not mean that there are no hyponyms with specific volitional interpretations - see many of the Kayardild and Dyirbal verbs discussed above - merely that the most basic perception verbs do not exhibit this distinction.

In no language we have examined is there a clear cut test comparable to the English progressive test which distinguishes activity from experience. Creoles based on English

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[12] The following example of this sense is provided in the entry: "*Ngayulu muṭi nuunpungkunytjala kulini.* I'm having a premonition from my knee twitching" (Goddard 1992:39).

[13] Peile (1997:49) goes on to explain that:
"Having a feeling about something," may be expressed with the verb, *pinalkarrala*, the root of which is the noun, *pina*, ear. The verb is similar, but not identical to *kulil-kulilpa*, which specifies some sort of insight into some future event.

also neutralize the distinction: in Krio *i bin lukim* may mean 'he saw him' or 'he looked at him', and *lijin* (< listen) may mean either 'hear' or 'listen'. We therefore assume that there is just a single lexical sense here, vague with respect to degree of control, and this is in fact the practice of most dictionaries of Australian languages, as the various glosses cited in this paper will attest. We adopt the practice of using the English verb for the non-controlled event type in the interlinear gloss, but the more specific and contextually appropriate verb in the free translation.

Nonetheless, there are a number of contextual clues which favour one reading to the extent that translations choose between e.g. 'see' and 'look at' in a regular way. After imperatives, for example, an activity reading is normal (natural given the implication that the activity is under the addressee's control), and after negatives of ability the experience state reading is normal. The two differing translations of Kayardild *marrija* in (1) below illustrate this clearly.

(1)
K[14]

dathina	*waldarra*	*dathinananganda*	*marralda*	*kuwajuwaa-j,*
that	moon	that.way	ear	twist-NFUT

can't	***marri-j,***	*kurndumaand.*	*'Kiija-tha*	*ngijinda*
can't	hear-NFUT	stoops.forward	draw.near-IMP	my

kangka	*kurulu-tha*	***marri-j,***	*kurulu-tha*	*kiija-tha*	*bathind!'*
words	properly	hear-IMP	properly-IMP	draw.near-IMP	from.west

'That (new) moon twists his ear like this, but can't **hear**, he's stooping forward with his hands behind his back. "Come close and **listen to** my words properly, come right up close from the west!"'

Imperfective aspect, continuous aspect and iterative reduplications favour the activity reading, since activities tend to last longer than uncontrolled (involuntary) perceptions. This is illustrated with parallel examples from Arrernte (2) and Mayali (3).

(2)
A

The	*nge-nhe*	*are-rlane-tyame*
I	you	see-CONT-PPr

'I was watching you' [interpretation linked to continuous aspect]

(3)
M

ø-nangah-na-ng.
I/you-ITER-see-PP

'I was watching you.' [interpretation linked to iterative reduplication]

An even clearer case of reduplication aligning with an activity reading is found in Dalabon. The verb *-wonan* , used without reduplication, normally has the sense 'hear', as in (4), (though see below for some extensions to 'understand'), while the reduplicated form usually has the sense 'listen', as in (5). It seems, however, that this difference falls out from the more general meaning of reduplication, which is persistence of the activity over time, since this is a natural correlate of listening but not of hearing. This is confirmed by the fact that *wona-wonan* will also be used for sensations drawn out over time, as when one hears dingoes calling out all night long (6).

(4)
D

Dah-wona-n	*kahmon?*
you/us-hear-PR	good

'Can you hear us O.K.?'

(5)
D

bulh	*kanihdja*	*kah-walkka-walkka-rr-inj*	*bulu*	*kah-yang-wona-wona-ninj*
there		3-hide-REDUP-RR-PP	them	3-language-REDUP-hear-PI

'He hid himself away there, and listened to them talking.'

[14] Throughout this paper we use abbreviations to identify the language of example sentences. These are listed at the end of the paper.

(6) *kah-djal-ng-nawoydo-duninj* *budjkvh-budj-kvn,*
D 3-just-SEQ-dingo-REALLY REDUP-bush-GEN

yilah-yang-wona-wona-n *yale-yu-yu.,*
we-talk-REDUP-hear-PR weSUB-REDUP-sleepPI

warrvkkvn *yale-yu-yu.*
before weSUB-REDUP-sleepPI

'They were real bush dingoes, we heard their howls as we were sleeping, before as we were sleeping, ...'

Another form of construction which favours a controlled activity reading is one which explicitly codes intent or volition. In a number of Australian languages, for instance, a dative-marked NP can replace what would normally be the absolutive-marked object of a transitive verb to indicate that the subject is attempting to perform the action with respect to the entity, but has not yet succeeded in his attempt. Perception verbs in this construction will tend to be interpreted as 'look for', 'listen out for', 'feel around for', 'taste for' and 'try to catch the scent of'. Compare the following Arrernte examples. In (7), the sentence is ambiguous between 'hear' and 'listen', but with the 'Dative of Attempt' construction in (8) purposeful direction of attention is entailed (cf. Wilkins 1989:180-181).

(7) *Kweke* *nhenhe-le* *arrpenhe* *mape-Ø* *awe-me*
A little this-ERG other mob-ABS hear-NP
'This little one hears / is listening to the others.'

(8) *Kweke* *nhenhe-le* *arrpenhe* *mape-ke* *awe-me*
A little this-ERG other mob-DAT hear-NP
'This little one is listening out for the other ones.' [i.e. Trying to hear when they're coming.]

As we mentioned above, to our knowledge there is just one Australian language that makes a systematic distinction between activity and experience verbs. In Paakantyi: (Hercus 1982:191; 1994) there is a stem-forming suffix *-la* which is linked in various ways with transitivity and intention. According to Hercus, "it focuses attention on the aims of an action, it makes an action definite rather than haphazard, and it is often best interpreted as conveying the meaning 'with intent'." With perception verbs, it creates the pairs:

bami- 'to see' *bami-la-* 'to look at; watch'
dhaldi- 'to hear' *dhaldi-la-* 'to listen'.

The sensory modality most commonly privileged with a distinct volitional verb in Australian languages is 'smell': many languages have a word glossed as 'sniff, smell' which can only be used of controlled, volitional perception; an example is Kayardild *bamatha* 'sniff, smell, take a breath'.

4.1.2 Source-based terms

The expression of the source-based series in Australian languages has largely been ignored; no dictionary provides this series for the full set of 5 sensory modalities and only a few dictionaries provide any source-based expressions.[15] We have therefore had to

[15] The *Eastern and Central Arrernte to English Dictionary* (Henderson and Dobson, 1994) is one of the few dictionaries to discuss source readings for at least some of the perception verbs. The third sense they identify for the verb *areme* 'see; look' is 'look to be a certain way (e.g. look sick), appear that way'.

rely, in this section, primarily on our own field notes and on the discussion of Warlpiri in Laughren (1992).

The treatment of source-based perception terms in the languages for which we have been able to get data is systematically different from English. Four types of construction are employed:

4.1.2.1 Use of secondary predicate construction with overt experiencer
English constructions like 'John looks tired', 'Mary sounds excited' etc. are 'covert deictics' (Fillmore 1971) in the sense that their full semantic representations require an explicit judge of the complement state: 'John looks tired (to me / to us)'. With a subset of perception verbs, Australian languages typically employ a secondary predicate construction here, where the perceptual judge appears as subject, the source of the stimulus as object, and the judgment as a secondary predicate on the object; in Kayardild (exx. 9-11), Arrernte (exx. 12-13) and Warlpiri (exx. 14-15) such secondary predicates agree in case with the object.[16] Examples are:

(9) *ngada* *kurri-ja* *niwan-ji* *mibulk-i.*
K 1sgNOM see-NFUT him-OBJ asleep-OBJ[17]
'I saw him asleep'; 'he looked asleep to me'.

(10) *malangarrba-ya* *ngada* *marri-ja* *dathin-ki* *dangka-y.*
K drunk-OBJ 1sgNOM hear-NFUT that-OBJ man-OBJ
'That man sounded drunk to me.'

(11) *ngada* *karrma-tha* *dangka-ya* *murldi-n-ki*
K I grasp-ACT person-OBJ be.soft-N-OBJ
'This person feels smooth to me, lit. I grasped this person soft.'

(12) *the* *Margie* *lhwarrpe* *are-me*
A I(ERG) M (ABS) sad(ABS) see-NP
'Margie looks sad to me'; lit. 'I saw Margie sad.'

(13) *the* *merne* *arrkerne-ke* *mwarre*
A I(ERG) food(ABS) taste-PC good(ABS)
'The food tasted good to me.' OR 'I could taste that the food was good': lit. 'I tasted the food good.'

(14) *maju* *ka-rna* *nya-nyi* *nyampu* *turaki*
W bad PRES-1sg see-NP this car
'I see that this car is bad/ this car looks bad to me.' [Laughren p.c.]

(15) *nganimpa-rlu=rnalu* *flour* *paja-rnu* *ngurrju*
W 1pl.exc-ERG=1pl.exc.SUBJ flourABS taste-PST goodABS
'We tasted (that) the flour (was) good', 'we tasted the flour (and it was) good.'
'The flour tasted good (to us).'

A variant of this strategy involves the omission of the subject, but with the source still in object function. Arrernte employs this strategy with both *areme* 'see; look' and *arrkerneme* 'taste' [see footnote 12]. While (13) above is vague as to whether it has something more like an experience (non-controlled) reading or a source-based state

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They note that "the one who looks a certain way is really the Object of the verb. Nothing is mentioned as doing the looking". Similarly, one of the senses they give for *arrkerneme* 'to try to do; test; taste; imitate' is '(food etc.) taste a certain way'. Again they note "The food here is actually the object of the verb; the one(s) doing the tasting are not mentioned."

16 Melissa Bowerman (p.c.) tells us that her children made systematic errors in English along these lines: 'Will *I* see it red?' 'Will *I* taste it good?' etc.

17 These glosses simplify the complexities of object marking in Kayardild - see Evans (1995) for full discussion.

reading, example (16), in which the subject is omitted, clearly has a source-based interpretation. In contrast, example (17a) is interpreted in the controlled activity reading primarily because it has both an overt subject and a dependent clause which implicates intent.

(16) *Merne* *arrkerne-ke* *mwarre.*
A food(ABS=O) taste-PC good(ABS)
'The food tasted good.'

(17) *Gavan-le* *merne* *arrkerne-ke* *mwarre* *peke* *arlkwe-tyenhenge.*
A Gavan-ERG food(ABS) taste-PC good maybe eat-SBSQT
Gavan tasted the food to see if it was good to eat.

The set of sensory modalities allowing this form of secondary predicate construction varies from language to language, but always includes 'see'. In Kayardild it is attested with 'see', 'hear' and 'touch, grasp'; in Arrernte and Warlpiri with 'see' and 'taste'. Note also that this is not the only meaning associated with this construction - with 'hear' as main verb another interpretation is 'hear X is/was ADJ' in Warlpiri, for example, and it is not translatable with a perceptual source sense [Laughren p.c.]:

(18) *Kuja-rnalu* *Japanangka* *purda-nyangu* *nyurnu*
W COMP-we.exc J heard dead
'When we heard (that) J (was) dead'
* 'When J sounded dead to us.'

4.1.2.2 Use of periphrastic constructions

For modalities which do not allow a secondary predicate construction to convey a source-based reading, the normal construction in some languages is a periphrastic one placing a perception verb in one clause and the adjective describing the state of the source in the other. In Arrernte this is the case with *aweme* 'hear; listen' and *anpeme* 'touch; feel'. Two Mparntwe Arrernte examples are:

(19) *Ampe* *kweke* *urinpe* *ne-ke,* *renhe anpe-rlenge*
A child little hot be-PC, 3sgACC touch/feel-DS
'The baby felt hot.'; lit. 'the baby was hot when it was touched.'

(20) *Ampe* *kweke* *awe-rlenge,* *rlkerte-arteke* *ne-me.*
A child little hear-DS, sick-SEMBL be-NP
'The baby sounds sick.'; lit. 'listening to the baby, it's as if it's sick.'

Note that in the above Arrernte examples, the perception verbs are in a dependent subjectless clause in which the source is the object, and the main clause is a copular clause with an adjectival complement and the source is the (understood) subject. Because the subject of the main clause is the 'source', while the unmentioned (supressed) subject of the dependent clause is the 'experiencer' (i.e. perceptual judge), the dependent clause is marked with the switch-reference suffix for Different Subject (cf. Wilkins 1988).

4.1.2.3 The uniqueness of 'smell'

Only for 'smell' have we found languages in which the same verb can be used for source-of-perception with source as subject and also for activity and experience event types with perceiver as subject. That is to say, the same verb can take either 'source' or 'perceiver' as subject, with a corresponding difference in event-type reading. Thus Kayardild *banyjija* can be used as an experiencer-based verb, as in (21-22), but also as a source-based verb (23-25); in the latter case it is typically nominalized and compounded with an adjective of smell-evaluation. In the experiencer-based (activity and experience) sense a formally related verb *barndija* or *bandija* may also be used; this cannot participate in the source construction.

(21) *banyji-ja* *diya-ja* *ngada* *barrngka-y*
K smell-NFUT eat-NFUT 1sgNOM lily.root-OBJ
'I tasted the lily roots.' lit. 'I smelt ate lily-roots.'

(22) *ngada* *bandi-ja* *buka-ya* *wuran-ki*
K 1sgNOM smell-NFUT rotten-OBJ food-OBJ
'I smelt rotten meat.'

(23) *dathin-a* *nguku-wa* *buka-banyji-n-d*
K that-NOM water-NOM rotten-smell-N-NOM
'That water smells rotten.'

(24) *dathin-a* *dangka-a* *wadu-banji-n-d*
K that-NOM man-NOM smoke-smell-N-NOM
'That man smells of smoke.'

(25) *dathin-a* *maku* *bitharri-banji-n-d*
K that-NOM womanNOM good.smelling-smell-N-NOM
'That woman smells good.'

Such linking alternations, where the same thematic role is linked with the subject in an intransitive construction and the object in a transitive construction, are highly unusual in Australian languages[18]: in Kayardild, for example, *banyjija* is the only verb with such an alternation. Worms (1942) mentions this alternation in the West Kimberley languages Garadyare (Karajarri), Yaoro (Yawurru) and Nyegena (Nyigina); other languages with this alternation include Gupapuyngu (*nhuman* 'smell, sniff around, give off a nice or nasty smell') and Djinang *nyumiki* 'give off an odour; stink; smell an odour'. We return to this point in §4.2.5 below, where we relate it to the relative salience of the source as opposed to the perceiver with 'smell' verbs, as opposed to those in other sensory modalities.

This absolutive pattern of argument alternations has given rise to two cognate sets which, again unusually for Australian languages, involve linkages of a single thematic role to objects in some languages and subjects in others.

In one set, a verb whose most likely original form was *bany-rdi* /baɲ-ɖi / [smell-stand][19] in proto-Gunwinygo-Pama-Nyungan,[20] with an original source-based 'smell' meaning, has undergone phonological simplification variously to *banyji, banji, bandi,* and *barndi* in various descendant languages, with semantic shift to experiencer-based 'smell$_{1/2}$' in some. In Kayardild the pair *banji-ja*[21] */ bandi-ja ~ barndi-ja* apparently represents two alternative assimilations each linked with a different meaning.

SOURCE-BASED SMELL$_3$:
Gunwinyguan: Jawoyn (Gunwinyguan) *bany-ciyi-* 'to smell (good), give off an odour', Mayali *bany-di-* 'there be a bad smell', Nunggubuyu *wanyja-* 'to smell (intr.), to emit a smell; to stink, to smell bad'
Tangkic: Kayardild *banyjija* 'smell$_{1/2/3}$', Yukulta *panyjija* 'to smell (intr.)'.
Pama-Nyungan: ; Warumungu (Pama-Nyungan) *parnta-* to smell (intr.), Ngarluma (Pama-Nyungan) *parnti(-ku)* to smell, to have odour

[18] See Evans (1989) and Austin (1992) for further discussion of the semantics of transitivity alternations in Australian languages.
[19] The etymologically original structure and meaning of this proto-form is preserved in, inter alia, Jawoyn and Mayali.
[20] The Gunwinyguan languages, along with Tangkic and Karrwan, are the closest relatives of the widespread Pama-Nyungan language family; the hypothetical proto-language referred to here is the putative ancestor of these four subgroups. See Evans & Jones 1997 for discussion.
[21] Phonemically / baɲɖiɖa /; the cluster *nyj* is simplified to *nj* in the practical orthography.

EXPERIENCER-BASED SMELL$_{1/2}$:
Gunwinyguan: no examples with this meaning.
Tangkic: Kayardild *bandi-ja* ~ *barnti-ja* 'smell, perceive by smell'; *banyji-ja* 'smell$_{1/2/3}$', Lardil *banji* 'to smell (perceive odour of)'.
Karrwan: *banjawa* 'smell (tr.)'
Pama-Nyungan:
Muruwari *pathi-* 'to smell, sniff', Pitjantjatjara *parnti* n. 'scent, odour', *parntinyi* 'give off a smell, scent', *parntini* 'smell, sniff',
Further development, presum. via 'sniff out', in Paakantyi: *parnta-* 'to search, to look for, to come out'.

There are also languages, all Pama-Nyungan, where the source meaning is a nominal or predicate nominal, and the activity meaning a derived verb; or where there are two verbs, with the activity meaning clearly derived from the source meaning: Diyari: *parni-* 'to be odourous', *parni-ma* 'to smell'; (*-ma* is a transivitizer – Austin 1992); Arrernte *ntyeme* '(intr) to give off odour', *ntye-rne-me* '(tr) to smell; to sniff'; Yinyjiparnti *parnti-* 'smell/give off odour', *parnti-ku* 'smell/detect odour of'. Finally, there are languages with an equipollent opposition between the two perception verbs: for example, Pitjantjara *parnti* 'scent, odour', *parntinyi* 'give off a smell, scent', *parntini* 'smell, sniff'.

A second etymon, reconstructable as **numa-* (with laminalization to initial *ny* or *nh* in Pama-Nyungan - see Evans 1988) and probably going back to a deeper level given the existence of more widespread non-PN cognates, appears to have originally meant 'smell' in the transitive sense and to have evolved in the opposite direction; shifts to the source meaning are only found in the Yolngu subgroup of Pama-Nyungan languages.

NonPN:
Maran: Warndarang *nyung* 'smell something'
Arafuran: Burarra *numa* 'smell something'
Gunwinyguan: Jawoyn *noma-* 'smell something', Mayali *nome-* 'smell$_{1/2}$', Mangarayi *numa-* 'smell (transitive)'

PN:
Yolngu subgroup: Dätiwuy *nyungayun* 'to smell something', Gupapuyngu *nhuman* 'smell, sniff around, give off a nice or nasty smell', Djinang *nyumiki* 'give off an odour; stink; smell an odour'
Wik-Mungkan *nhuumaN* 'avoidance smell',
Wik-Ngathan *nhumey* (n.) 'smell, body odour'
Djabugay *nyungka-l* 'smell (tr.)'
Yidiny *nyunja-l* 'kiss'; Yidiny Jalnguy *nyungka-R* 'smell'
Umpila: *nhu:ngka* 'smell (tr.)'
Guugu Yimidhirr *nyu:mal* 'smell, sniff'
Gugu Yalanji *nyu:mal* 'smell, taste'
> Wemba-Wemba *nyumila* 'to think', prob < 'smell'

In a few languages the experiencer-based and source-based senses of 'smell' have a more symmetrical relation, with the same formative incorporated into or compounded with different verb roots. In Warlpiri, for example, we have the pair *parnti-nyanyi* 'to smell something', and *parnti-mi* 'to smell; to stink; to emit an odour', and in Walmajarri the pair *parnti-nyu* 'smell' , as in *wulyu pa parntilany pujungun* 'newly fallen rain smells good', and *parntimanu* 'smell', as in *parntimanany parlipa warlu manyjirnujangka jirrjingu* 'our noses smell a fire burning'. Note also Watjarri *parntimanja* 'produce smell, scent', *parntingamanja* 'smell (something)'. In several Gunwinyguan languages there is an opposed pair in which the activity verb incorporates a root meaning 'smell' into 'see', while the source verb incorporates the same root into the intransitive verbalizer: an example is Dalabon *bobna* [smell-see] 'smell, perceive by smell', *bobmu* 'smell, emit an odour', and further examples will be given below. Even in these languages, however, the olfactory modality is the only one to allow such a balanced construction, and the

symmetry is not complete either since the verb root with the activity sense is semantically more specific (deriving from 'see') than the root with the source-emission sense.

So, in contrast to the other four senses, 'smell' is the only one which as a source-based verb typically takes the source as subject in Australian languages, and a large number of Australian languages lexically distinguish source-based 'smell$_3$' from experiencer based 'smell$_{1/2}$'.

4.1.2.4 Use of nominal for source

A final strategy for encoding a source-based event type is to use a nominal naming the source, rather than a verbal construction. Kayardild uses this construction with 'taste', as in:

(26a)	*danda*	*mirra-a*	*bid-a*	*wuran-d*
K	this-NOM	good-NOM	taste-NOM	food-NOM
	'this food tastes good'			

(26b)	*dan-da*	*birdi-ya*	*bid-a*	*wuran-d*
K	this-NOM	bad-NOM	taste-NOM	food-NOM
	'this food tastes bad'			

4.1.2.5 Representational types: summary

Figure 7 summarizes the constructions used in Arrernte and Kayardild for Viberg's fifteen cells. As it shows, controlled perception verbs are not differentiated lexically from the non-controlled ones except occasionally with 'smell', as in Kayardild. Source-based 'smell' tends to be lexically distinguished from activity and experience, and also tends to have source as subject. For the other four sensory modalities, the source constructions most commonly employ the same verb as is found in activity and experience uses, either with an overt or covert perceiver and a second predicate on the object ('O.PRED') corresponding to the subject complement expressed in English, or in a periphrastic (biclausal) structure (as is the case for Arrernte 'hearing' and 'taste'). In Kayardild, the expression of source-based 'taste' is not done with a verbal predicate, but uses a nominal naming the source.

	Activity (Controlled)	Experience (non-controlled)	Source-based
sight	look at A: <S> *are-* <O> K: <S> *kurrija* <O>	see A: <S> *are-* <O> K: <S> *kurrija* <O>	look (S.COMP) A: (<S>) *are-* <O> <O.PRED> K: <S> *kurrija* <O> <O.PRED>
hearing	listen to A: <S>*awe-* <O> K: <S> *marrija* <O>	hear A: <S>*awe-* <O> K:<S> *marrija* <O>	sound (S.COMP) A: [periphrastic, dependent clause contains *awe-*] K: <S> *marrija* <O> <O.PRED>
touch	$feel_1$ A: <S> *anpe-* <O> K: <S> *karrmatha* 'hold, grasp' <O>	$feel_2$ A: <S> *anpe-* <O> K: <S> *karrmatha* <O>	$feel_3$ (S.COMP) A: [periphrastic, dependent clause contains *anpe-*] K: <S> *karrmatha* <O> <O.PRED>
taste	$taste_1$ A: <S> *arrkerne-* <O> K: <S> *kamaja* <O>	$taste_2$ A: <S> *arrkerne-* <O> K: <S> *kamaja* <O>	$taste_3$ (S.COMP) A: (<S>) *are-* <O> <O.PRED> K: <S> ADJ *bida*
smell	$smell_1$ A: <S> *antyerne-* <O> K:<S> *bamatha* <O>	$smell_2$ A: <S> *antyerne-* <O> K: <S>*ba(r)ndija* <O>, <S> *banjija* <O>	$smell_3$ (S.COMP) MpA: <S> *antye-* K: <S> ADJ-*banjinda*

Fig. 7: Viberg grid for Mparntwe Arrernte and Kayardild

On the basis of his research, Viberg (1984:135) observed that "most languages use fewer than 15 verbs to cover the 15 meanings of the basic paradigm". However, the Australian languages appear to be fairly radical in their degree of lexical conflation. In Arrernte, only 6 distinct verbs are used. Kayardild, which appears to be unusual in the Australian context in having three distinct verbs for the sensory modality of 'smell', only has 7 distinct verbs (and a non-verbal way of dealing with $taste_3$). The only sensory domain where a large number of Australian language have more than one lexical verb is 'smell'. Given the typically 'derived' nature of the source-based set, and the lack of consistent differences between the sets denoting controlled vs non-controlled perception, we will henceforth restrict ourselves to considering just the five basic perception verbs. We now turn to the question of semantic extensions across modalities.

4.2 Semantic extensions across sensory modalities

On the basis of his survey of more than 50 languages, Viberg (1984:136) sets up the following simplified modality hierarchy based on attested semantic extensions and polysemies across sensory modalities in the domain of perception verbs:

sight > hearing > touch > { smell / taste }

Figure 8 : Viberg's (simplified) modality hierarchy

Essentially the hierarchy indicates that a verb originally referring to 'sight' can extend its meaning to refer to 'hearing', and a verb originally referring to 'hearing' can extend its meaning to refer to 'touch' and so on. The pattern of extension is, however, unidirectional. A verb originally referring to 'touch' never extends to cover 'hearing', and a verb originally referring to 'hearing' never extends to cover 'sight'. The above hierarchy obscures the fact that patterns of extension do not always operate contiguously. While shifts always preserve the pattern of extension from 'higher' modality to 'lower' modality in the domain of perception verbs, the extensions may skip certain intermediate modalities. Viberg (1984:147) presents the complete network of attested shifts in a refined version of the hierarchy (Figure 9).

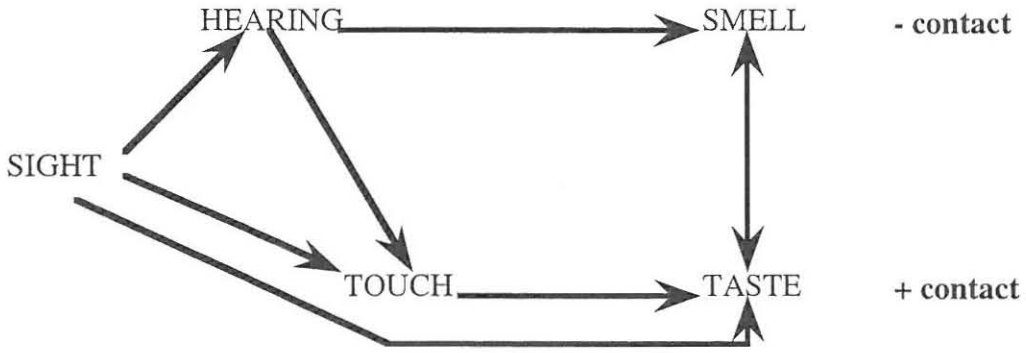

Figure 9: Viberg's refinement of the modality hierarchy for polysemy in perception verbs

Before examining how far the Australian data supports this analysis, we need to distinguish two types of semantic extension that we will be using as evidence: direct and indirect.

Direct extensions, which involve polysemy proper, extend from one sensory modality to another with no formal marking of the difference, as with:

Yir Yoront	*karr*	'see, look at; hear, listen'
Gugu Yalanji	*nyajil*	'to see, hear, perceive'
Guugu Yimidhirr	*nhaamaa*	'see, look at, hear; think'
Mayali	*bekkan*	'hear, listen to; feel'

In such cases, we rely on comparative and historical work to determine the direction of shift. For example, as we showed in §3, the 'see' verb reconstructable for proto-Australian is **na*, with development to **NHaa* in proto-Pama-Nyungan, and this is the form that gives rise to the Gugu Yalanji and Guugu Yimidhirr forms above; thus confirming the extension of 'see' to cover 'hear' in those languages.

On the other hand, extensions may be indirect, requiring some overt marking. As noted in our methodological discussion in §3, this is a matter of heterosemy rather than polysemy proper. Typically this involves the adjunction or incorporation of a noun designating either the body part used, e.g. 'ear see' for 'hear', or the source, e.g. 'taste see' for 'taste', 'smell see' for 'smell', as in the Djabugay and Mayali examples below; there is a tendency for the organ to be designated with the sense modalities that are higher on the hierarchy, and the stimulus with those that are lower on the hierarchy as in the Kurtjar set. Sometimes the meaning of the extra element is not known, or is not distinguishable from the whole complex, as with Warlpiri preverb *purda-* in *purda-nyanyi* 'hear, listen etc.'

Djabugay	*ngundal*	'see, watch, look at'
	bina ngundal	'hear, listen' [bina: ear]
Mayali	*bekkan*	'hear, listen; feel'
	manjbekkan	'taste' (lit. 'taste-hear')
	kukbekkan	'touch' (lit. 'body-hear')

Kurtjar	*ak*	'perceive; (esp.) see; find out; (also) meet, hear, smell'
	rdengkarr.ingk ak	'hear' [ear-ergative/locative see/perceive/hear]
	oongk ak	'smell' [odor see/perceive/hear]
Warlpiri	*nyanyi*	'see, look at'
	purda-nyanyi	'hear, listen [etc.]
	parnti-nyani	'smell (trans.)'

As noted in §3, we include evidence from both direct and indirect extensions, for the following reasons:

> (a) the patterns tend to be parallel - our evidence will show that what one language does by direct extension another will do by derivation.
>
> (b) the difference is sometimes rather arbitrary, since in many languages the sense-specific noun will frequently be omitted, but is available should clarity be required. An example of this is Yir-Yoront where *karr* is listed with the meanings '1. see, look at, watch. 2. hear, listen'; the second has the synonym *pin-karr* 'ear-see' but the first has no synonym.
>
> (c) in some sense the cross-modal extension has already been made if we are to interpret the collocation, e.g. 'see a smell'.

We now proceed to examine the attested extensions one by one, working downward through the sensorium.

4.2.1 Extensions of 'see' to other sense modalities

Extensions of 'sight' to 'hearing', both direct and indirect, have been exemplified from seven Australian languages in the preceding section. Of these seven, five languages — Yir Yoront, Gugu Yalanji, Guugu Yimithirr, Djabugay, and Kurtjar — are all from the region around the southern half of Cape York, which suggests that the extension of 'sight' to 'hearing' could be an areal phenomenon in that part of Australia.

Other examples of the shift of 'sight' to 'hearing', outside of the Cape York region, include, Jaru, Ngaliwurru and, perhaps, Wardaman. Along with Warlpiri, these languages are part of a north-western areal block, characterised by having a small, well-defined set of mono-morphemic verb roots. In this case, extension correlates with the fact that there is a reduced set of lexicalised distinctions in the verb class.[22] For Jaru, Tsunoda (1981) notes how under most conditions a verb compound (VC) involving the verb 'to see' is used to render the notion 'hear, listen', while in the imperative the 'see' verb on its own is used in the sense of 'listen'. The relevant form, *nyang-* 'see; look' is clearly a descendent of the Australian proto-verb for 'to see' mentioned earlier, and Tsunoda writes (1981:184):

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[22] It is well-known that there is a linguistic area in the north-west part of Australia in which languages have small closed class sets of monomorphemic verb roots (see, for instance, Dixon 1980). This area cross-cuts the distinction between Pama-Nyungan and Non-Pama-Nyungan. Among the Pama-Nyungan languages, for example, Warlpiri has only 120 verb roots, Warumungu 53, Warlmanpa 43, and Walmajarri and Djaru have about 40. Among the Non-Pama-Nyungan languages, Wardaman has about 130 (with 8 used with a very high frequency), Wagiman has 45, Jaminjung about 30, and "some languages of the Kimberleys and the Daly River area have only about a dozen roots to which can be added verbal inflections" (Dixon 1980:280). In all the instances we have examined of languages with limited sets of verbs, if a language has a perception verb, it will be 'see'. There is no language with a 'hear' verb that does not have a 'see' verb. As we have seen in Warlpiri and Djaru, 'hear; listen' is often derived by virtue of a preverb added to the verb 'to see'. However, the verb for 'hearing' is also often derived on the basis of an addition the verb for 'take' or 'do' (e.g. Walmajarri).

> Djaru has very few verbs — only about 40 ... But, Djaru has more than 290 preverbs and in many cases what is expressed by a single verb in Djirbal is expressed by a VC of a preverb and verb in Djaru, even basic notions such as 'hear/listen to' — *bura nyang-* Vtr 'hear/listen to' (*bura* preverb 'listening', *nyang-* Vtr 'see/look at') ... But, at least in the imperative, i.e. *nyang-ga*, this verb alone (without the preverb *bura* 'listening') can mean 'listen'. The writer heard this on many occasions. ... It appears that when *nyang-ga* 'see'-IMP is used in the sense of 'listen', the sentence consists of just this word and no other words (e.g. subject, object) at all. This 'marked' use of the verb 'see' is syntactically extremely limited.

In Ngaliwurru (Schultze-Berndt p.c.), a language with only about 30 verb roots, there is a simple verb for 'to hear', *-malangawoo*, but this is almost certainly based historically on *-ngawoo* the verb 'to see'.[23] Finally, with respect to Warndarang, Merlan (1994:174) speculates that:

> The few verbs which end suggestively, for the purposes of historical analysis, in *-rna* are: *jomarna-* 'to finish off', *ledbarna-* 'see'. and *wojbarna-* 'listen' this may be relatable to *na-* 'see'.

The extension of 'sight' to 'smell' has also been exemplified in the previous section for Kurtjar and Warlpiri ; an example with a noun meaning 'smell' incorporated into the verb is from Dalabon; as the four forms below illustrate, 'hear' is likewise derived from 'see' by incorporation,[24] and both 'see' and 'hear' may then transfer to 'smell' (see §4.2.2 for extension of 'hear' to smell in Dalabon):

Dalabon	*nan*	'see, look at'
	wo-nan	'hear, listen to [etc.]'
	bob-nan	'smell (tr.)'
	dolng-wo-nan	'smell smoke'

(27)	*manjh*	*kah-bob-mu*	*ngah-bob-na-n*
D	meat	3-smell-INCH-NP	1/3-smell-see-NP
	'I can smell the meat.' (lit. 'the meat smells, I smell it')		

'See' is not attested with extensions, whether direct or indirect, to the senses involving direct contact: touching and tasting.

4.2.2 Extensions from 'hear' to other sense modalities

'Hearing' is attested with extensions to all three lower senses. In Mayali *bekkan* 'hear, listen' can extend to 'feel by touch' without formal marking, as in (28), or it may incorporate the noun *kuk* 'body, physical presence' to give *kukbekkan*, which can only mean 'feel (by touch)'.

(28)	*La*	*ø-wurlebmeng*	*ø-yawam*	*ku-rrulkdulk-kah*
I	and	3P-swam	3P-searched	LOC-REDUP-tree-LOC

ø-ngimeng	*kanjdji*	*wurrno-kah ,*	*ø-yawam*
3P-entered	inside	hollow.log-LOC	3P-searched

kure	*ø-wurlebmeng*	*kun-kudji*	***ø-bekkang***	***ø-karrmeng,***
LOC	3P-swam	IV-one	3P-heard	3/3P-grabbed

---

[23] In Jaminjung, Ngaliwurru's closest relative, the verb for 'see' is *-ngawoo,* but 'hear; listen' is an extended meaning of the verb *-ooga*, which is glossed as 'TAKE'.

[24] The etymology of *wo-* is unknown. Unlike *bob* 'smell' and *dolng* 'smoke' it is not a productive incorporating noun, but comparison with roots in neighbouring languages (e.g. Mayali *-wok* 'language') suggests it may have originally meant 'words, language'.

ø-bekkang ***ø-karrmeng.***
3/3P-felt 3/3P-grabbed

'Again he went down and searched for it, this time feeling inside a hollow log in the water, he searched around under the water and he felt it and grabbed it. ..'

In Warlpiri *purda-nyanyi* 'hear, listen to' (itself extended from *nyanyi* 'see' by preverb) will have a 'feel (proprioceptively)' reading when used reflexively with a complement of evaluation (Laughren 1992:222). For 'feel by touch' another verb (e.g. *marnpirni* 'feel with hand') will be used.

(29) *wati-ngki ka-nyanu purda-nya-nyi murrumurru*
W man-ERG PRES-REFL hear-perceive-NP sore:ABS
'The man is feeling sore.' (lit. 'the man hears himself (to be) sore').

Similarly, in Yidiny, *binangaaaji-N*, the reflexive form of *binanga-L* 'hear, listen to', "has the metaphorical meaning 'feel oneself', literally 'listen to oneself, to see how one is' (Dixon 1991:103). As noted earlier, Arrernte *welhe-* 'feel (proprioceptively)' is also originally derived from *awe-* 'hear; listen' plus the reflexive suffix *-lhe*. In Pitjantjatjara, one of the senses of *kulini* 'hear; listen', without reflexive, is 'feel a bodily sensation' (as in 'When he wants to go to the toilet, he feels a burning sensation').

'Hear' also occasionally extends to 'smell'. In Dalabon, as we have seen, the generic verb for 'smell' is derived by incorporating a noun 'smell' into 'see', whereas 'smell smoke' is literally 'smoke-hear'; an example is:

(30) *ngah-dolng-wonan ngah-mey, mey kah-kíkinj George,*
D 1/3-smoke-hearNP 1/3-picked.up food 3/3-cookNP

njelng, yalah-ngu-yan-kvn.
for.us we-eat-F-GEN
'I can smell that smoke coming up now from George cooking dinner for us, so that we will eat.'

In Mayali, the verb for 'taste' is *manjbekkan*, which incorporates the noun root *manj* 'taste'; however, since *bekkan* can mean either 'hear' or 'feel by touch' we cannot be sure whether this is an extension of 'hear' or 'feel by touch'. Note also the following example, in which *bekkan* is used with a second predicate on the object-source in a source/judgment construction with a 'taste' meaning (lit. they tasted it foul); it is not clear whether this extension is possible outside the source construction.

(31) *birri-bo-nang njamed birri-doy djidjerok birri-bonguneng*
M:I they-water-saw whatsit they/it-struck melaleuca they-drank

birri-bekkang na-bang and birri-wam wanjh.
they/it-heard MA-'cheeky' they-went then

[Here they lived thirsty (at one time). They ate (only) honey.] 'They went and got water out of the Melaleuca trees but it tasted foul and so they kept going.'

4.2.3 Extensions of 'smell'

'Smell' occasionally extends to 'taste'. Kayardild *banyji-ja*, discussed in §3.1.2.3 above, basically means '1. smell (intr.) 2. smell (tr.)' but in a coverbal construction with the verb 'eat' can mean 'taste':

(32)	*banyji-ja*	*diyaja*	*ngada*	*barrngkay*
K	smell-ACT	eat-ACT	1sgNOM	lily root-OBJ
	I tasted the lily roots.			

Worms (1942:124) mentions extension from 'smell' to 'taste' in Bardi, attributing the extension to the noun *nyaar*, but since his example involves a sentence it may also be interpreted as polysemy of the preverb plus verb combination *nyaar i-nen* 'it smells/tastes'.

In Gugu Yalanji *nyumal* means 'smell or taste (trv.)'; comparative evidence points to an original 'smell' meaning for this verb - see §4.1.2.3.

There are no examples of 'taste' extending to 'smell'.

4.2.4 'Taste' and 'touch'

In §4.2.2 we discussed a Mayali indirect extension of 'hearing' to 'taste', which we acknowledged could possibly be interpreted as an extension of 'feel by touch' to 'taste', given the fact that the base verb was polysemous between 'hear' and 'feel by touch'. Otherwise, verbs for 'taste' and 'touch' are not attested with extensions to other sensory modalities. Indeed, these verbs are often only marginally lexicalized in Australian languages, so that 'taste' is often a sense of 'try', and 'touch' is often a sense of 'grasp' or 'hold'.

Examples of languages in which 'try' and 'taste' are rendered by the same verb are numerous.

Ungarinyin	*argu*	'to try, to taste'
Alyawarra	*arrkerneyel*	'1. try something out 2. taste something',
Kukatja	*yarrkala*	'1. taste 2. try'
Yidiny	*banja-L*	'try (to do), test, taste'
Guugu Yimithirr	*baadal*	'try, taste',

The fact that a verb meaning 'try' in the context of food and eating will be interpreted (via this particular bridging context) as meaning 'taste' is not unusual and is attested in many languages of the world. Dixon (1991) presents Yidiny examples of *banja-L*, in the sense of 'taste', which have that meaning only in combination with 'eat' and which he explains as meaning literally 'try eat'. This seems parallel to the Kayardild example in the previous section where 'smell eat' is used to mean 'taste'. Other languages have 'taste' as an extension of 'bite', e.g. Lardil *betha* 'to bite; to taste, have a taste of, eat a sample of'. Similarly, Warlpiri *paja-rni* 'to taste; savour' is almost certainly descended from an original proto-Pama-Nyungan verb **paja-* 'to bite; chew' (cf. O'Grady 1990:220).

In Ngiyampaa (Donaldson 1994; 1980), both 'taste' and 'feel' are complex forms premised on the notion of 'testing' (or 'trying') with a certain bodypart: *nga-thali* 'taste', literally 'test-with mouth', and *nga-mali* 'to feel', literally 'test-with hand'. Although there is often evidence that 'try' is the primary meaning of a verb, and 'taste' a secondary meaning, in some cases, e.g. Ngalakan *many-ngu* 'taste, test' the etymology shows the 'taste' meaning to be original (the form is identical to Mayali *manj-ngu* discussed above).

Kayardild is an example of a language where the verb for 'grasp' or 'hold', *karrmatha*, is extended to mean 'feel, touch' (see §4.1.2.1 and §4.1.2.5).

4.2.5 Overview

Figure 10 summarizes the Australian findings. As in Viberg's study, 'sight' is at the top of the modality hierarchy. In the Australian data, it extends to the other 'non-contact' modalities 'hearing' or 'smell', but no other basic perception verb extends to 'see'. 'Hearing' is next; unlike 'see' it also extends down to all other modalities, including the two 'contact' modalities ('touch' and 'taste'). As discussed earlier, a number of Australian languages have a sixth perception verb, 'feel (proprioceptive)', which is commonly expressed as the reflexive of 'hear'. 'Smell' extends to 'taste' but to nothing else. Depending on the interpretation of one Mayali example, there could be a case for an extension of 'touch' to 'taste'. Thus, if we consider just the five basic modalities (excluding 'feel proprioceptive'), then a comparison of Figure 10 and Figure 9 shows that the only extension in the Australian data that is not included in Viberg's figure is that of 'sight' to 'smell'. Conversely, the only extensions in Viberg's data that are not attested in the Australian data are 'sight' to 'taste' and 'taste' to 'smell'. Such differences, however, are minor and do not in anyway reorganize the modality hierarchy as proposed by Viberg.

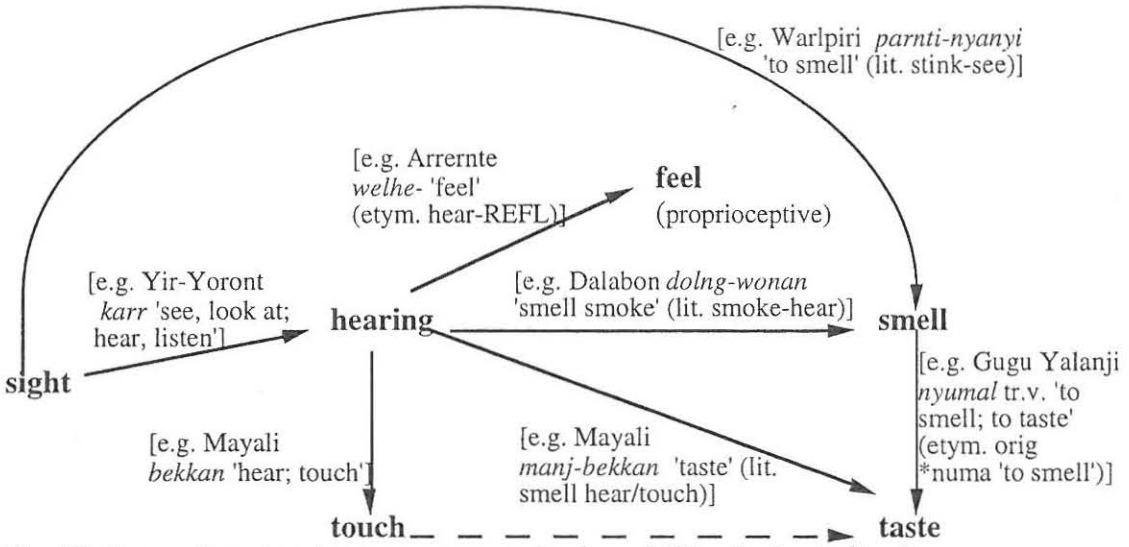

Fig. 10: Semantic extensions across perceptual modalities in Australian languages

It is probably useful to remind the reader that some of the shifts appear to be attested primarily in specific regions of Australia. Thus, the shift of 'sight' to 'hearing' is particularly common in the southern half of Cape York, and in the north-western region in which languages have small sets of monomorphemic verb roots.

There is an interesting correlation between the directionality of shifts, uniformly from the 'higher' to the 'lower' senses, and the relative salience of perceiver and stimulus in the linguistic treatment of the different senses.[25] [26]

---

[25] An interesting cryptotypic manifestation of this in English is the difference in interpretation of certain locational adjuncts. Compare 'I saw him from behind the rock', where 'behind the rock' can only modify the subject, with 'I smelt him from behind the rock', which is ambiguous between subject-modifying and object-modifying readings.

[26] This skewing of salience is one likely reason for the near-converse relation between extensions of sense verb downwards, and synaesthetic extensions upwards (Williams 1976), e.g. from 'sharp to the touch' to 'sharp note': perception verbs basically recruit from actions of perceivers, while synaesthetic adjectives recruit from properties of the stimulus. However, the converse relationship is not perfect, since on Williams' schema 'touch' transfers to 'smell' as well as to 'color' and 'sound'. Unfortunately we have very little data on synaesthetic adjectives in Australian languages and do not pursue this question further here. Viberg (1984:158-160) discusses the relation of his findings to findings about synaesthesic relations and also discusses the significance of reverse patterning. Note that some earlier treatments of perception verbs (e.g. Bechtel 1879) emphasized the parallelism between the senses in terms of stimulus as an etymological source for all five modalities.

We have already seen the unusual behaviour of 'smell' verbs, the only widely lexicalized lower-sense verb in Australian languages: they are the only verbs in the whole sensory lexicon which undergo an argument-structure shift between source-subject and perceiver-subject. Moreover, it is only in the modality of 'smell' where Australian languages commonly lexicalize the distinction between the source-based event type and the experiencer-based (activity and experience) event type. But there are other manifestations of this difference in salience of perceiver and stimulus.

Thus the higher senses, if they need to be specified in a language like Kurtjar with a more abstract 'perceive' verb, do so by means of an involved body part, e.g. *rdengkarr.ingk a.k* 'see/perceive with the ears' for 'hear'. On the other hand the lower senses are usually specified in terms of the source: (*oongk*) *a.k* 'see an odour' in Kurtjar, 'body-hear' for 'touch' and 'taste-hear' for 'taste' in Mayali. Kurtjar, however, retains the possibility of specifying 'smelling' in terms of the organ, especially when discussing animals: (*wongk*) *a.k* 'smell (with the nose, especially for animals)' (Black & Gilbert 1986:1).

We see the same skewing when we consider etymologies of perception verbs. In Kayardild, for example, the higher verbs appear to be old compounds of a body part with a stance verb *-di -ja~ -rri -ja~ -ji -ja* , originally 'stand': *kurrija* 'see' based on *kuwa* 'eye', i.e. 'eye-stand', *marrija* 'hear' based on *marral-* 'ear', i.e. 'ear-stand'. But *banjija* 'smell' appears to be derived from the perceptual source: an old root *bany-* 'stink (n.)' with *ji-ja*, i.e. 'stink-stand'.

Overall, then, the fact that our findings with regard to semantic extensions in the domain of perception verbs correlate so closely with Viberg's supports the idea of a degree of universalism as far as the lexicalisation of perception verbs is concerned.

The only people who would be surprised by these findings are the "anthropologists of the senses". Classen (1993) in discussing the ranking of the senses in a historical perspective, scoffs at Western hubris in ranking 'sight' in the highest position followed by 'hearing'. She argues (1993:7) that "[s]ensory orders are not static entities, they change over time just as cultures themselves do". But we have seen that, at least in the realm of perception verbs and their semantic shifts, a rank order does hold, both across cultures and across time (since it is derived from diachronic perspective), and it is very close to "the standard ranking" she suggests is merely a Western cultural product. Classen (1993:5) writes:

> When almost every other aspect of human bodily existence — from the way we eat to the way we dress — is now recognized as subject to social conditioning, it is surprising that we should still imagine that the senses are left to nature.

But why shouldn't the senses, at least in some small part, be left to nature. A radical relativism that attempts to deny any universal bases for human experience must argue its case from empirical evidence, on a case by case basis. There is no reason to assume that relativity in one domain of human experience argues against universality in another domain, as Classen seems to imply. In discussing the cross-linguistic uniformities in ethnobiological (taxonomic) classification, Berlin (1992) speaks of "perceptual givens that are largely immune from the variable cultural determinants found in other areas of human experience". He writes:

> Human beings everywhere are constrained in essentially the same ways — by nature's basic plan —in their conceptual recognition of the biological diversity of their natural environments. In contrast, social organization, ritual, religious beliefs, notions of beauty — perhaps most of the aspects of social and cultural reality that anthropologists have devoted their lives to studying — are constructed by human societies.

The perception verb data, then, suggests that within the domain of perception verbs "nature's basic plan" may be a stronger force than cultural conditioning when it comes to lexicalisation patterns and directionality of semantic shifts. Whether this is also true for

trans-field metaphorical shifts from the domain of perception to that of cognition will be explored in the following section.

5 Trans-field mapping of perception onto cognition

In the last section we saw that the pattern of extension within the semantic field of perception verbs is basically as predicted by Viberg, and confirms the primacy of vision as the source for semantic extensions to other modalities. We now turn to trans-field semantic extensions from the sensory to the cognitive domain, and here we will find a radical departure from the Indo-European pattern. We will demonstrate that in Australian languages it is 'hear' rather than 'see' which regularly maps into a large set of cognitive verbs, including 'knowing', 'remembering' and 'thinking' as well as the more familiar 'understanding' and 'heeding'. 'See' only rarely extends into the cognitive domain (usually via 'recognizing visually', thence sometimes to 'know (esp. by sight)'), and more commonly denotes interpersonal emotion and communication such as 'meet with', 'look upon with desire', 'choose' etc. 'Smell' , 'taste' and 'feel' also have limited sets of extensions into the cognitive domain.

In this section we first examine the way in which syntactic frames can be used to distinguish cognitive and perceptual senses of such verbs, at least in some languages; this is relevant to the question of whether we are dealing with a clear distinction between perceptual and cognitive senses in the languages in question. Then we anticipate the lines of development of 'hear' and 'see' by examining the semantic extensions of the associated body-parts, 'ear' and 'eye' in a typical language, Kayardild. From there we pass through semantic extensions of the verbs themselves, starting with 'hear' and moving on to 'see', 'smell', 'taste' and 'touch'. We conclude by summarizing the overall pattern of mappings from sensory modalities into cognition and emotion, and discussing the extent to which there is a recognizable geographical patterning.

5.1 Distinguishing perception and cognition senses of polysemous verbs

In a language with a single verb for 'hear' and 'think' (or 'see' and 'think', for that matter), it is not immediately obvious that we are dealing with two distinct senses, since we could be dealing either with an entire semantic system that does not systematically distinguish perception from cognition, or at least with some verbs that abstract away from the difference, with the result that we have a vague rather than a polysemous meaning. For instance, Pawley (1994), discussing the verb *nŋ* in the Papuan language Kalam, claims it has a unitary meaning which merges perception and cognition. He writes (1994:392) that *nŋ* is:

> a mental predicate with a meaning more general than KNOW, THINK or FEEL... which denotes awareness, conscious perceiving, that is both sensing and cognising, in which the perceiver is (at least partly) in control, or at least is a wilful actor. In different contexts *nN*, occurring as the lone content verb in a clause, may be glossed as 'know, be conscious, be aware, be awake, think, see, hear, smell, taste, feel, recognise, notice, understand, remember, learn, study'.

Pawley (1994:393) goes on to point out that *nŋ* "also occurs, accompanied by nouns or adjuncts or other verb stems, in a number of lexicalised phrases that translate specific English verbs of awareness." - Thus, 'feel by touching' is 'touch *nŋ* ', 'taste' is 'eat *nŋ* ', 'see' is 'eye *nŋ* ', 'hear' is 'ear *nŋ*, and so on. In discussing Pawley's paper, Wierzbicka (1994:455-6) dismisses his claim that *nŋ* has a single unified meaning on the grounds that

he fails to say what the supposedly unitary meaning is.[27] We do not regard this as a clear rebuttal of Pawley's position, since he could equally borrow a Wierzbickan argument and claim that he has only "failed" to provide a unitary meaning because *nŋ* is an undefinable semantic primitive in Kalam. Still, one would like to see more formal evidence to substantiate one or the other position, and in this section we review some of the structural clues which can be used for distinguishing the distinct senses of a polysemous verb.

For the Australian language Pitjantjatjara, Bain (1979:126) similarly claims a lack of distinction between perception and cognition senses of a basic verb:

> there is no way to differentiate the concepts of thinking, listening and heeding in Pitjantjatjara. The same verb *kulini* does duty for all.

In this case, however, there is clear evidence that we are dealing with distinct senses. In response to Bain's claim about Pitjantjatjara, Goddard (1994: 237), has pointed out that the three senses of *kulini* have different syntactic frames: "Only the THINK sense can take a 'quasi-quotational' clausal complement (often introduced by alatji 'like this')", "[o]nly the 'hear, listen' sense can take a non-finite circumstantial complement", and "[o]nly the 'heed' sense can take a locative case complement." These three distinct syntactic frames for *kulini* are exemplified in (33), (34) and (35), respectively.

(33) *Ngayulu* *alatji* *kulini,* *"tjinguṟu-la..."*
P I like.this think:PRES maybe-we
'I think this about it, "maybe we..."'

(34) *Ngayulu* *aṉangu-ngku* *wangkanytjala* *kulinu*
P I people-ERG talk:NOMZR:LOC hear:PAST
'I heard people talking.'

(35) *Wati* *katjangku* *mamangka* *kulintja* *wiya*
P man son:ERG father:LOC heed:NOMZR no
'The son won't heed his father.'

Thus, if we can find different syntactic possibilities associated with distinct readings of a verb, — for instance, if we find that each sense has its own corresponding case frame and its own distinct set of entailments — then a reasonable case can be made for polysemy.[28]

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[27] Wierzbicka (1994:455-6) writes that Pawley: 'insists that the meaning of *nŋ* is unitary (in the name of the general methodological principle that "semanticists and lexicographers should first seek a unitary meaning for a word".., but again, he doesn't say what this supposedly unitary meaning is.'

[28] The trick here, however, is to make sure that there isn't a good argument for saying that a particular 'sense' is not simply a function of a more general meaning of the verb in composition with the meaning that can be attributed to the morpho-syntactic frame. There is widespread disagreement on how to treat this problem, ranging from those who take different combinatorics as evidence for polysemy, to those who say the different combinatorics induce the meaning differences and that polysemy can only be established when two senses are possible in the same syntactic environment. Our stand falls between these positions: where the difference in meaning can be explained as a result of the syntactic environment, and exhibits parallels across a number of comparable lexemes plugged into the same range of frames, we take these to be simply contextual variants, whereas when the difference can only be arbitrarily related to the syntactic frame, or is limited to a single lexeme, we treat them as lexically different senses. For example, the fact that all sense verbs in Kayardild will get a controlled reading when they occur with an imperative, and that this can be derived from the logical need for an activity to be controlled if one is to order someone to carry it out, is an argument that these are merely contextual senses. On the other hand, the fact that only 'hear' projects an 'understand' meaning in Kayardild, even though 'see' is perfectly compatible with semantic extensions to 'understand' in other languages (see e.g. Alm-Arvius 1993 on English 'see') suggests this sense is lexicalized. In the Pitjantjatjara/Yankunytjatjara case being considered here, there is no semantic reason why *alatji* 'like this' should not take a complement of hearing ('I heard like this, the following:...'); to the extent that such combinatorial characteristics are arbitrary, a polysemy analysis is favoured.

In Warlpiri (Laughren 1992:223) "it is significant that when a perception verb selects a 'state of affairs' rather than an 'individual' as its object of perception, it can assume a range of meanings which diverge somewhat from the prototypical sensory perception meaning the verb has when selecting an 'individual' as its object of perception. This tendency is evident from the accompanying English translations" in (36-7), in both of which the element of evaluation present in the small clauses *turaki .. maju* '(the) truck .. bad' and *pirrjirdilki ... yapa* 'the person .. strong' bleeds back into the perception verb, requiring a translation as 'see that, consider that' or 'feel that' rather than simply 'see' or 'feel'.

(36) *Turaki nyampu ka-rna nya-nyi maju.*
W vehicle this:ABS PRES-1sgSUBJ see-NP bad:ABS
'I see/think/consider/feel/reckon (that) this car (is) no good.'

(37) *Pirrjirdi-lki marnpu-rnu yapa ngangkayi-rli*
W firm:ABS-CS feel.with.hand-PAST person:ABS medicine.man-ERG
'The medicine-man felt the person to be strong.'
(as when he touches a sick person's stomach and finds it feels firm to touch.)

Related to the above is the fact that verbs are often used without an overt object when they have a cognitive meaning. In Pitjantjatjara, for example, *kuli-* will frequently be used with no overt object when it means 'understand':

(38) *Ngayulu puṯu kulini.*
P/Y I in.vain hear/understand
'I can't understand.'

Another potential formal test for showing the distinctness of perceptual and cognitive senses is repetition without tautology. In the following Arrernte sentence, for example, the verb *awe-* 'hear, listen; understand' is subordinated to itself; the subordinate verb has a cognition sense, while the imperative verb has a directed perception sense:

(39) [Alice Springs Traditional Owner speaking to Yipirinya School Children about the
A Dreamtime creation of a site that they're all visiting. His opening instruction is:]
Arrantherre anteme awe-rrirre-me-le awe-Ø-aye!
2pl.SUBJ now hear-pl-NP-SS hear-IMP-EMPH
Now you each must understandingly listen! [i.e. listen in order to extract understanding of the country and its origins]

So, differences in syntactic frame, and the possibility of self-conjunction without a sense of redundancy, provide clear evidence that distinct senses are involved. But there is a further, more semantic, type of evidence that can be used to argue against a monosemous analysis: the impossibility of formulating a semantic analysis that covers just the relevant semantic range of the form without being too narrow or too broad. Thus, a further piece of evidence against a monosemous account for 'hear/think' in most Australian languages comes from the impossibility of formulating a definition that would include 'hear' and 'think' while excluding 'see' and 'be conscious', for example. Unlike the Kalam example, where the postulated general meaning extends to the entire domain of perception and cognition, the meanings of 'hear' in Australian languages extend to only some types of perception and some types of cognition, making a monosemous analysis correspondingly harder to formulate.

5.2 Semantic derivatives of body parts

An initial view of the contrasting extensions of 'see' and 'hear' can be gained by comparing the cognitive, social and emotional extensions of 'eye' and 'ear' in Kayardild:

Eye: ***miburlda [mibur-]***	Ear: ***marralda [marral-]***
dunbuwa miburlda [extinguished eye] 'blind'	*dunbuwa marralda* [extinguished ear] 'deaf; stupid; unable to understand' *marralwarri* [ear-PRIV] 'stupid, inattentive, disobedient, unable to understand'
Visual experience: *muthaa miburlda ngada* [lit. many eye I] 'I've seen a lot' Visual acuity, esp. in the hunt: *mibur-jungarra* [eye-big] 'keen-eyed person, good hunter' Supervision and monitoring: *miburiji karrngija* [eye-remote-LOC keep] 'keep an eye on, monitor' Courting and sexual desire: *mibur-muthanda* [eye-excessive] 'lecher, "big-eye"'; *mibur-thaatha* [eye-return] 'ogle, stare at with sexual intent' Aggression: *ngarrkuwa miburlda* [strong/hard eye] 'bold; brazen; stern-faced'.	Memory: *dunbuwatha marralda* [ear become extinguished] 'forget', *marral-dunbuwatha* 'forget', *marral-durldiija* 'forget'. Understanding: *marralmirra* [ear-good] 'smart, having a good ear' Thought: *marral-marutha* [ear-put] 'think about; miss' Imagination/dreaming: *marralngulatha* 'dream about' [*marral-* is 'ear'; *ngulatha* is only attested in this word]

Fig 11: Semantic extensions of *miburlda* 'eye' and *marralda* 'ear' in Kayardild

As this example shows, 'ear' recurs in a number of phrases involving various sorts of cognition pertaining to understanding, memory and forgetting, thought and dreaming, whereas 'eye' has no cognitive extensions except to visual experience, with its non-perceptual meanings being limited to various types of social interaction: supervision and monitoring, courting, desire and choice, and aggression. 'Eye' is taken as the faculty of vision, whereas 'ear' is the faculty both of hearing and of understanding. In Tyemeri (Nick Reid p.c.) 'ear' is even polysemous to 'idea, thought', as in (40):

(40) *'ya detjeri ngerimbaty' meny ngiti*
Ty hey 'ear' I have he.said to.me
'Hey I've got an idea' he said to me.

In Walmajari the word for 'eye', *mil*, shows no apparent trans-field extensions, but there are numerous extensions of *pina* 'ear': *pina-jarti* (lit. having an ear') 'intelligent'; *pina-jularnu* (ear-tell) 'tell about'; *pina-kangu* (ear-carry) 'take and show (e.g. a place)'; *pina-l-karra* (ear-Manner.Adverb) 'remembering; keeping in mind'; *pina-ngurru* 'one who is learned, wise'; *pina-pina-karrinyu* (ear-ear-stand) 'think'; *pina-rri* 'knowing; knowledge'; *pina-yanu* (ear-go) 'go expectantly'; and *pina-yungu* (ear-give) 'show-teach'.

Similar bifurcations in the patterns of extension of 'eye' and 'ear' are widespread in Australian languages, and have been discussed so many times (Schebeck 1978, Sommer 1978, Dixon 1980:112, Seear 1995; Peile 1997) that we will not say more here. We note, however, that in many languages the words for 'see' and/or 'hear', and their corresponding social interaction and/or cognition verbs, are based on 'eye' and 'ear' (see Figure 4, in §3). In Martuthunira, for example, the noun *kuliya* 'ear' gives the verbs *kuliya-L* 'to hear', *kuliya-npa-ø* 'to think; to believe' and *kuliya-rri-ø* 'to feel; to be aware of state of health'. Consider also Jiwarli *kurlga* 'ear' next to *kurlgayi-ru* 'to hear; to listen'; *kurlganyu* 'pleased; thinking', and *kurlganyu-rri-a* 'to think; to think about'.

5.3 Extensions of 'hear/listen'

We now pass to the various extensions of the 'hear/listen' verb into the cognitive domain.

5.3.1 'Hear/listen' to 'heeding and obeying

Extensions from 'hear' or 'listen' to 'heed' or 'obey', are widely attested in Indo-European and are discussed by Sweetser (1991:43):

> '[R]eadiness to internally receive and understand implies also a readiness to subject oneself to the influence of the speaker's content - and hence perhaps a readiness to further respond in the way desired (e.g., to obey if a command is involved.).... The link between physical hearing and obeying or heeding - between physical and internal receptivity or reception - may well, in fact, be universal rather than merely Indo-European'. [Sweetser 1990:41-2]

Such extensions are indeed also common in Australian languages. We have already encountered uses of Pitjantjatjara/Yankunytjatjara *kuli-* with this sense (ex. 35). Other languages with this semantic range are Wik Mungkan *ngeeyan* 'listen, understand, hear (and obey)' and also *aak ngeeyan* 'obey, listen, understand' (*aak* 'place, home, camp, ground, country'), and Lardil *merri* 'hear, listen to; obey, pay heed to', for which a sentence example is:

(41) L
Kuba mangarda kiin, merral-kub-u. Warngelani merri danga-n.
good child that ear-good-PROP instantly hear person-OBJ
'That child is good, and obedient; he obeys people instantly.' [literally: 'That good child has good ears; (he) instantly hears people.'] (Ngakulman Kangka Leman 1997)

There are also, of course, languages with a distinct form; examples are Arrernte *akangkwirreme* 'pay attention to someone; heed; obey'; Walmajarri, where *mapunikanu* 'obey; take notice of; believe' is based on *mapun* 'true', and Burarra, where *yagurrma* has the range 'agree to, obey, give assent to'.

5.3.2 'Hear/listen' to 'Understand'

'Understand' in Indo-European languages is attested as developing into, rather than from, hear, as is the case with French *entendre*. In Hebrew, however, the verb *s-m-?* , whose basic meaning is 'hear', is frequently translated as both 'obey/listen' and 'understand'. In Australian languages unmediated extensions from 'hear/listen' to 'understand' are extremely common, and within our survey are never formally marked as derivations, although, as we shall see in later sections, derived extensions from 'hear/listen' to 'think' or 'know' may also include 'understand' in their meaning range. As examples of languages with a simple 'hear, listen, understand' range, consider Dalabon (42)[29], Kayardild (43), Arrernte (39) and Alyawarra *aweyel* 'hear, listen; understand'.

(42) D
*Wanjing yibvn yang kah-**wonan** wanjingh*
one there language 3-hear-NP one
'One boy can understand (Dalabon) language,' [cf. examples 4, 5, 6]

(43) K
Ngada marri-jarri dathin-ki kang-ki.
1sgNOM hear-NEG.ACT that-OBJ language-OBJ
'I don't understand that language.' [cf example 1]

Kriol speakers often translate the relevant verb with 'hear' or 'listen' where 'understand' is meant, particularly in the context of language. Thus in the following example Alice Bohm translated Dalabon *wonan* as 'listen to', but the context made it clear that she meant 'understand': she was discussing the need to maintain knowledge of the language by talking it to her children and grandchildren.

[29] The 'understand' meaning in Dalabon is usually associated with the unreduplicated form. As noted in §4.1.1, the reduplicated form of this same verb usually has the sense 'listen'.

(44) *kenbo bulah-woniyan bulu ngah-marne-yenjdjung-iyan yang-walvng.*
D future they/me-hearFUT they I-BEN-talk-FUT language-ABL
"I gotta talk to everybody in language and they'll listen to me." [i.e. 'then they'll be able to understand me.']

Although dictionaries of Australian languages do not always make the distinction clear, many languages distinguish between understanding language, which will be expressed by the 'hear/listen' verb, and understanding other things, which will be expressed by a distinct verb meaning 'know, understand'. In Kuninjku, for example, *bekkan* 'hear, listen to', is used when stating that someone understands language; the form *wokbekkan*, incorporating the nominal form for language, may also be used (45). On the other hand, understanding of concepts, about mythology, or food, and so on, will be expressed by *bengkan* (central and eastern dialects), whose basic meaning is 'know' (46).

(45) *Nga-wok-bekka-n.*
I I/him-language-'hear'-NP
'I understand his speech.'

(46) *Yoh, nawu kun-red ngarri-h-ni all the Aboriginal*
I yes that IV-place we-REL-sit

marrek ngarri-bengkayi bakki,
NEG we-understandIRR tobacco

or njalehnjale marrek ngarri-bengkayi kandidjdjawa and djukka,
whatever not we-understandIRR flour sugar

marrek ngarri-bengkayi.
not we-knowIRR

'All we Aboriginal people in the camp we didn't understand what tobacco was and we didn't understand sugar or flour. We didn't know.'

Despite the frequency of extensions to 'understand' from 'hear, listen' in Australian languages, there are other sources as well. In particular verbs of grasping frequently extend, as they do in Indo-European, to 'understand'. In some cases there is true polysemy, as with Djinang *marki* 'get; pick up; obtain; understand; receive'; while in other cases there is derivation (as with Djabugay *dugayi-y* 'comprehend', cf *duga-l* 'fetch, grab') or incorporation of a particular type of abstract object, as in Dalabon *yang-ma*: [language-get]:

(47) *mak bo njerr bvla-yang-mang, mak bvla-yalvng-yang-mang*
D not ? us they-language-get not they-then-language-get
'Must be they don't understand language.'

5.3.3 'Hear/listen' to 'Think'

Extensions to 'think' are less common than to 'understand', and almost invariably occur in the presence of extensions to 'understand'.[30] Most sources do not specify which meanings of 'think'are possible: 'think about/of X', 'think that X', 'think X COMP' (e.g. 'think someone good') or 'think it over/consider'. Thus, in this section, we treat what are no doubt a series of distinct extensions as if they were the same.

Many languages have verbs for 'think' with no perceptual sense (though perhaps with extensions to other types of cognition), e.g. Djapu *guyangi* (tr.) 'think that, think of',

[30] Sources on some languages do not include 'understand' as a sense of this lexeme, but give no translation equivalent for English 'understand'; Wik-Ngathan (Sutton 1995) is an example, as is Nunggubuyu *wawangki-* 'listen, pay attention, think'.

guyanga 'think'; Kayardild *marralmarutha* 'think about, miss'; Burarra *borrwa-* '1. think, consider, remember, recall 2. look after, be concerned with'.

Nonetheless, a significant number of languages have polysemies including this range:

Ngar	*yangkura*	'hear, understand, think'
Kukatja	*kulila*	'1. hear 2. listen 3 understand, think 4. recognise 5. obey 6. auscultate'.
Pitj/Yank	*kulini*	'1. listen to, heed; 2. hear; 3. think about; 4. decide; 5. know about; 6. understand; 7. remember; 8. feel bodily sensation; 9. have a premonition'
Luritja	*kulinu*	'heard; understood; thought; believed and obeyed what has been told you'
Warluwarra	*rlari-*	'hear, listen; understand; think'
Banjalang	*gannga-*	'hear, listen, think, understand, feel'
Ngalakan	*banarr-*	'to hear, listen, understand, think about'

Example sentences for four of the uses of Kukatja *kulila* are:

(49) *Kurrunparanintirrinpa, kurruntu kulirninpa langakurlu puntungkalu nyininpa.* Kuk *Kulirninparna wiyarna purtarrinpa.*
'The spirit becomes knowledgeable; the spirit understands by the way of the ear [which] is in humans. I understand, I'm no idiot (lit. not become no good).'
(Valiquette ed. 1993:37)

(50) *Kulirninparna yiilku katawana mimikurlulu.*
Kuk 'I recognize the blood [going through] my head when I'm sick.'

(51) *Ngurratipilu kulinma kalyutjirratja.*
Kuk 'He is camping out and is concerned about water.' V 156.

(52) *Kamina wiya kulirninpa, yumu tjiiwanpa, wiya warnnginytja.*
Kuk 'The girl doesn't obey, she's just unaware (of things). She doesn't desire intercourse.'

In many other languages 'think' is derived from 'hear, listen; understand' by reduplication (52-55), reflexivization (56-7) or incorporation (58).

(52)	Wik-Ngathan:	*ngeethe-*	'hear, listen'
		ngeeth-eche	'think' (reduplication of *ngeethe*)
(53)	Oykangand:	*aliya-*	'listen, hear'
		aliyiya-	'think, recall'
(54)	Watjarri:	*ngangkunmanja*	'listen, hear' (tr.)
		ngangkungangkunmanja	'think' (intr.)
(55)	Dalabon:	*wonan*	'hear, listen; understand'
		wonawonan	'hear, listen (over a period)'
		wonarrvn	'think about'
		wonawonarrvn	'listen to oneself'
(56)	Mayali:	*bekkan*	'hear, listen'
		bekkarren	'consider, think about before making a decision'
(57)	Dyirbal:	*ngamba-l*	'hear, listen'
		ngamba-yirri-y	'think'

(58)	Ngandi:	*nga-*	'hear' (tr.)
		yic-nga-	'think' (intr.), *yic-* 'thinking, truth'

In Yukulta *marrija* means 'listen, hear' when used transitively, and 'think, feel' when used intransitively (Keen 1983:276); the reduplicated form *marrinymarrija* has a middle case frame and means 'to dream of/think of someone (i.e. to tune into their vibrations)'. This gloss is interesting, suggesting that 'thinking of' is conceptualized less in terms of generating an internal representation and more in terms of tuning in to an object with an external existence.

In addition to extensions from 'hear', many words for 'think' are compounds based on 'ear'. We have seen the example of Kayardild *marralmarutha* 'think about, lit. ear-put' as well as Walmajarri *pina-pina-karrinyu* (ear-ear-stand) 'think'; a similar series in Gugu Yalanji, based on *milka* 'ear', is *milka-bu wukurril* (ear-with follow) 'to think about', *milka dumbarril* (ear break) 'to think about', and *milka-bu baykul* (ear-with ?) 'to think about'. Sear (1995) contains a comprehensive listing of ear-based compound verbs for 'think' in Australian languages.

5.3.4 'Hear/listen' to 'Know'

A few languages show direct extensions of 'hear, listen' to 'know'. In most cases the semantic range also includes 'understand' and/or 'think', as with Wakaya *larr-* 'hear, understand, know' (Breen pc), Yawurru *langka-* 'know it, hear him, understand', Warlpiri *purda-nyanyi* 'hear, listen to; understand; know; recall; perceive; judge; determine etc.', Ngarluma *wanyaparri(-ku)* 'hear, listen, know, recognise, know how to, listen to, think it is X', and Pitjantjatjara *kuli-* which can have the meaning 'know about' (59) in addition to the semantic range discussed in §5.3.3 above.

(59)	*iriti-la*	*takata*	*kulintja*	*wiya.*
P/Y	long.ago-LOC	doctor	hear/know-NOMZR	NEG
	'In the old days we didn't know about doctors.'			

An example involving derivation is Wemba-Wemba *nyernda* 'to know, understand', from *nyerna* 'to hear' (Hercus 1994:118).

There is evidence from some languages which use 'hear' for 'know' that the use is confined to cases where the sensory modality giving rise to the knowledge is hearing. Dixon (1993), commenting on the lack in Dyirbal of a lexical exponent with the precise meaning 'know', points out that there is no way to say 'I know where the money is' – instead one would say 'I saw where the money is' or 'I heard where the money is'. Another example is Gugu Yalanji, in which *nyajil* 'see, hear' is also used for knowledge reached through these senses, whereas knowledge reached by other means is expressed as *jibabu nyajil* 'to know without seeing or hearing anything', lit. 'see/hear with the liver':

(60)	*mari*	*doctorangka*	*jiba-bu*	*nyajil*	*yina*	*jalbu*	*wulay*
KYal	man	doctor-ERG	liver-with	perceive	that	woman	die
	'The doctor man knows by instinct that woman will die.' (Oates 1992:103)						

5.3.5 'Hear/listen' to 'Remember and recall'

Some dictionaries of English give 'remember' as a distinct sense of English 'see', e.g. Macquarie: 'see 3: to imagine, remember, or retain a mental picture of: *I see the house as it used to be*'. Australian languages consistently have 'remember' either as an extension (direct or indirect) of 'hear' or as a derivation or compound of 'ear'. In Wemba-Wemba *nyerna* has the semantic range 'to sit, to listen, to hear, to remember'; Gugu-Yalanji has *milka nyajil* lit. 'see with the ear' means both 'to hear' and 'to recollect'; note also *milkabu manil* 'remember', lit. 'get with the ear'.

A couple of the languages we have already seen include 'recall' in the semantic range of a verb extending from 'hear' to 'know': Warlpiri *purda-nyanyi* 'hear, listen to; understand; know; recall; perceive; judge; determine etc.' and Nunggubuyu *yanga* 'hear, listen to, understand, remember, think about'.

An obvious bridging context for the development from 'hear' to 'recall' is the recollective hearing of remembered names (which may simply be metonymic projections of nouns designating the objects). Dixon (1991:37) furnishes a nice example: the Yidiny verb *binangal* means 'hear, listen to (O can be noise, or people); think about, remember (O can be people, place etc.)', and his careful translation of the following example suggests how 'remember' arises by implicature from 'listen to':

(61) *bamaan guwal jarral galiingal / garru binangalna bulmba wanyja galing*
Y [Guyala replied:] 'People's names must be given to places all along the way. So that by-and-by [people] can listen to [and remember the sequence of place-names along a route and know] where the places are going to.'

A similar example from Dalabon is (62), from a story recounting a hunter's revenge on a group of Mimih spirits who tricked and assaulted him; at this point in the text he is trying to find his way back to the place where they attacked him and proceeds by 'hearing' in his mind the names of the places along the way. Although the Kriol translation Evans was given for this sentence was "he bin know himself where he's going", the best translation into standard English would be 'remembered the way'.

(62) *"ngale! kvhrdvh-kah kvhrdv-kah kvhrdvh-kah" kah-rok-wona-rre-ninj.*
D oh.yes this.way this.way this.way 3-way-hear-RR-PP
"Oh yes, along this way, this way, this way" he remembered / recalled / knew the way along.

We might wonder whether the range of such verbs is confined to aural and verbal recollection, or is more general; unfortunately few sources are explicit on this point. In Pitjantjatjara/Yankunytjatjara, however, it is clear from the following example that visual recollection is included in the 'remember' sense of *kulini* 'hear; listen; heed; think; know; remember':

(63) *yunpa-na putu nguwan kulini*
P/Y face-I in.vain hardly hear/remember
'I can't really remember the face.' [Goddard 1992:39]

More common than the extension of 'hear' to 'remember' is the use of a distinct verb, often based on the noun for 'ear': examples are Arrernte *irlpe-angkeme* (ear-speak) 'remember', Djabugay *binarra-y* 'remember' (cf bina 'ear'), Yir Yoront *pinal=yam* 'remember, lit. ear-carry', Nyawaygi *bina-mbi-Ø* (ear-INCHoative) 'understand; remember' and Wik Mungkan *konangam pi'an* 'remember', lit. 'mind, keep or look after with the ear'. It is also worth reiterating at this point that in Jiwarli *kurlga* 'ear' is glossed as 'remember' when used as a particle. Many other expressions having to do with memory are also typically based on 'ear' - e.g. Kayardild *marraldunbuwatha* 'forget, lit. ear become useless', *marraldurldiija* 'forget, lit. ear-shit', and the many Nyulnyulan languages in which one says, for example, 'my ear is him' (e.g. Bardi *alamar i-nen djen*) for 'I remember him' and 'my hear it is him hurricane' (e.g. *Nimanburru nalebab inan djen williwilli-en*) for 'I still remember that terrible hurricane' (Bill McGregor p.c.).

5.3.6 Extensions of 'hear' to the cognitive domain: summary

We have seen that 'hear' regularly extends to a number of verbs in the cognitive domain: not only understanding and obeying, but also thinking, remembering and knowing. Figure 12 summarises just the direct, polysemous, extensions from 'hear/listen' that were discussed in this sub-section. However, we have also shown that there are numerous indirect, derived, extensions from 'hear; listen' which show the same regular pattern of

association to higher cognition. Moreover, evidence was presented that shows derivations based on 'ear' also replicate the pattern. So, this is no novel occurrence, but a strongly recurrent theme which runs counter to Sweetser's proposal concerning the types of extension we should expect with 'hear'.

Languages	HEAR / LISTEN	UNDER STAND	THINK	KNOW	REMEMBER / RECALL	OBEY / HEED
D; K; A; Alyawarre	+	+				
Wik Mungkan	+	+				+
Ngaliwurru, Banjalang, Warluwarra	+	+	+			
Nunggubuyu	+	+	+		+	
Kuk; Luritja	+	+	+			+
Pitjantjatjara	+	+	+	+	+	+
Warlpiri	+	+		+	+	
Yawurru; Wakaya	+	+		+		
Ngarluma	+		+	+		
Yidiny	+		+		+	
Wemba-Wemba; KYal	+				+	
Lardil	+					+

Figure 12: Patterns of polysemy: Direct extensions of 'hear/listen' to cognition senses

This pattern reflects an Australia-wide tradition that the ear is the organ of intellection as well as hearing. As we show in §7, there is a cluster of rationales underlying this network, such as grasping language, stories and names as the key to socially transmitted information, and the summoning of verbal/aural records in recollection. But, although verbal recollection may be prototypical, the resulting cognitive verbs extend to all sorts of mental construct and cognitive processing: for example, remembering or knowing faces, as well as names and sounds. We will now see how this pattern of extensions contrasts with the extensions of 'see' and, less importantly, 'smell'.

5.4 Extensions of 'see' to the cognitive and social domains

Most extensions of 'see' in Australian languages lead into the domain of human interaction: desire and sexual attraction, supervision, and aggression. Such extensions are of course not uncommon in European languages, but make up a greater proportion of the extensions of 'see' verbs in Australian languages.

In general, eye contact is far more communicatively loaded in Aboriginal communities than in European societies (see §7.2). As Hansen and Hansen (1992) note in their entry for the Pintupi verb *nyangu* 'looked; saw':

> the norm is for limited eye contact in conversations and addressing longer gatherings; prolonged eye contact which is the European norm can be offensive, implying that you don't trust or recognise the person; prolonged eye contact with the opposite sex, can be interpreted as a sexual advance; ...

So, we will first consider the somewhat commoner extensions of 'see' to verbs of social interaction, before passing on to the rarer occasions where 'see' extends into the cognitive domain proper.

5.4.1 'Sight' and Social interaction

DESIRE AND SEXUAL ATTRACTION.

Kayardild *kurrija* 'see' is representative in its semantic extensions: in addition to its basic meaning it can extend to 'desire, look upon with lust', as in the phrase *kambin-kurrinda* [daughter-seeer] 'incestuous father', and also 'choose (esp. as spouse)':

(64) *bulbirdiya* *maku-wa* *kurri-i-j*
K wrong.category woman-NOM see/choose-PASS-NFUT
'A woman of the wrong kinship category was chosen (as wife).'

Idioms for flirtation, romantic liaisons and desire that are based on the reflexive-reciprocal form of 'see' are widespread. In Western Arnhem Land such verbs may be used as predicates, as in (65), or deverbally to designate lovers, as in (66); these Dalabon examples have exact calques in a string of neighbouring languages, such as Mayali and Ilgar. Sometimes the noun 'eye' is incorporated, giving an expression which has all the connotations of English 'they look into each other's eyes'.

(65) *barrah-na-rr-vn* *mararradj*
D they-look-RR-NP illicit.affair
'They are looking at one another, (with the purpose of) illicit sex.'

(66) *yarrah-na-rr-vn* *ngey-kvn*
D 1a-see-RR-NP 1sg-GEN
'my girlfriend/boyfriend' [lit. 'mine (such that) we gaze at each other']

In Pintupi there are a number of idioms which include both *kuru* 'eye' and *nyangu* 'see' and have sexual interpretations or connotations. Thus the phrase *kuru nyakula pungu*, which literally means 'seeing (her) eye hit (it/her)', is used to indicate that someone 'realised another's desire; i.e. another of the opposite sex'. In a note to the idiom *kuru nyangu* (eye saw) 'stared at; peered at', Hansen and Hansen (1992:41) write "to stare a known person in the eye is ill mannered as it can imply ulterior sexual motives". Other related idioms based on 'eye' include *kuru-ku mikurringu* (eye-for desire) 'to desire a frienship with one of the opposite sex' and *kuru-lu nintinu* (eye-with show/teach) 'indicated with the eyes; a means of making arrangements with the opposite sex to get together.' Other Western Desert languages show similar idioms, thus we find Pitjantjatjara, *kuru nyanganyi* (eye-see) and *kuru wangkanyi* (eye talk) both meaning to 'make eyes at someone, flirt', and in Kukatja, *kuru-kankurrarriwa* (eye-become.unable.to.see) 'become sexually awake'. Such, idioms based on 'eye' are not confined to the Western Desert languages. For instance; while the first meaning given for Alyawarr *annga atherrk-atherrk* (eye green) is 'like you're blind, getting the wrong thing', the second extended meaning is 'someone who marries "wrong way", marries inapproprate relations' — the associated gloss given to the cognate Arrernte term, *alknge atherrke-atherrke*, is '[offensive language] someone who is doing wrong by taking a partner who is the wrong "skin" for them or who is already married'.

AGGRESSIVE AND OTHER NEGATIVE SOCIAL INTERACTION.

Extensions to agression are not common with the verb 'see' itself, but in languages that combine a 'see' auxiliary (or light verb) with an uninflected lexical verb, the collocations can denote a range of aggressive social acts. In Tyemeri, for example, the auxiliary *nginnyinggin*, which on its own means 'see', participates in the following collocations: *tisit nginyinggin* 'to be jealous of someone' [*tisit* only occurs in this construction], *nginipup nginnyinggin* + IMPERS 'be made to feel out of place, or ill at ease' e.g. *dengini dinyingginngi nginipup* 'I felt out of place' [*dengini* 'body', *nginipup* 'body rub']. In Jaminjung, which is structurally similar, one example of the verb *-ngawoo* 'see' used on its own has been attested in the extended meaning of 'argue', but far more commonly 'argue' is rendered by combining the coverb *wirrij* 'fight' with *-ngawoo* 'see'. Schultze-Berndt (in prep) notes that other coverbs which combine with the verb *-ngawoo* 'see' to render complex verbs of aggression are *dirrija* 'jealous', *ngarl* 'bark', *nyool* 'sulk' and *gambaja* 'laugh'. In Mayali the compound verb *widnan* , built from *-wid* 'different' and *-nan* 'to see', means 'to hate', lit. 'to see as different' or 'to look at as one looks at someone different'.

There are also idioms based on 'eye' indicating negative and aggressive social interaction. Thus in Arrernte we find *alknge-uthneme* (eye-bite) 'be jealous of someone'. Similarly, in Yidiny we find *jili-guba-N* (eye-burn) 'feel jealous towards someone', and

also *jili-gunda-L* (eye-cut) 'make someone look away (by staring at them and making them ashamed)'. Finally, in Pintupi, two idioms of agression are *kuru watjanu* (eye said) 'accused to face; blamed to face' and *kuru panypurangu* (eye spoke.against) 'belittled to his face; rubbished to his face'.

SUPERVISION AND OVERSEEING.
Many Australian languages extend derivatives of 'see' (often the reduplicated form) to mean 'watch over, supervise, oversee' and so on, just as European languages do. Examples are Mayali *nan* 'to see', with its reduplicated form *nahnan* 'look after, watch over, care for, look out for', as well as the derivative *worhnan* 'look after, be the boss of'; Gaagudju *goro-garra* 'to see', *goro-garra-garra* 'to look after', and the Jaminjung preverb plus auxiliary combination *mayimayibba gani-ngawoo* [preverb he/him-sees] 'he thinks about someone, worries about someone'. In Arrernte, the verb *arntarnte-areme* 'to look after, to care for' is built on the verb *are-me* 'to see; look', and, historically, the verb *akareme* 'to keep an eye on something for someone' is also likely to have been derived from the 'see' verb.

Parallel derivations based on 'eye' include Yidiny *jili-budi-L* (eyes put down) 'look after', Kuku-Yalanji *miyil-da kujil* (eye-with keep) 'to guard something (keep one's eyes on it)' and Pintupi *kuru yutura kanyinu* (eyes hiding kept) 'carefully looked after; cared for'.[31]

MEETING AND VISITING.
As a final case of the extension of 'see' in the social interactional domain, we find that in some Australian languages the verb which means 'see' extends directly to 'meet' and/or 'visit'. This is, of course, similar to English uses of 'see', as in "I'll be seeing Pat tomorrow". In Arrernte, for example, the full meaning range given by Henderson and Dobson (1994) for *areme* is '1a. look at something, see, watch; 1b. visit someone; 1c. meet someone, meet up with him; 1d. find something or someone, come across; 2. look for something; 3. look to be a certain way; 4. shine on something; light it up'.[32] 'Meet' is also one of the senses of the Kurtjar verb *ak* 'perceive; see'. For Yidiny *wawa-L* 'look at, see', Dixon (1991:260) notes that "[t]his very frequent verb ... has a wide meaning including: look for, find, encounter", and it seems likely that a 'meet up with' sense often derives through pragmatic extension from a simple 'encounter' ('come upon') sense where human beings are the object of the action. Other examples in which 'vision' and 'meeting/visiting' are clearly associated are Walmajarri *pirmarnu* 'peep, as looking from round a corner; peer into something, as a hollow log when looking for game; visit' and Kukatja *ruunyala* 'see and meet'.

5.4.2 Extensions of 'See' to cognition

RECOGNITION, KNOWLEDGE.
A few languages extend 'see' to mean 'recognize (visually)', often with an incorporated word for 'body'; sometimes this extends on from 'recognize' to 'know'. Thus one Mayali derivative of 'see', incorporating the root *burrk-* 'body', is *burrknan* 'recognize'. A related language, Ngalakan, extends the sense of the cognate verb bur?ṇa- to 'know, understand', although the one example sentence in the source (Merlan 1983:192) could equally well be translated with 'recognize (visually)':

(67)	ŋu-bur?ṇani-koro	ṇugun?biri	bigur
Ngal	I/him-know-PRES.NEG	that	man
	'I don't know that man.'		

Warray *na-* 'to see' gives rise to the compounds *let-na* 'to look after' and *mitj-na* 'to know, to recognize'.

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[31] Hansen and Hansen (1992:41) explain this idiom more fully by noting it is "used of closely caring for an older person when they are mourning death of one of their friends or relatives."

[32] Other Australian languages also have an extension of 'see' to 'shine'. For instance, Gooniyandi (McGregor pc) *mirri milaa* (sun he:sees:it) 'the sun shines'.

The 'see' auxiliary in Tyemeri occurs in two collocations concerned with recognition: *yilil nginyinggin+* 'to be able to recognize something', but the only available example involves visual recognition (more specifically, looking but not recognizing), and *miyilil nginyinggin+* 'recognize someone or something'.

In Warlpiri 'see' can take on a judgment or evaluation sense, with state-of-affairs complements only (§5.1); this use has not been reported for other Australian languages.

In a number of languages, we find that the verb 'see' can take clausal complements, "direct quotes", which represent a deduction based on visual evidence. For Gooniyandi, McGregor (1990) discusses what he terms "projection of thoughts", and notes that the verb *mila-* 'see' can enter in to the same construction as verbs referring to mental processes (like 'think'). He writes (1990: 421-422) that "[i]n this case, the projected clause represents a thought that was perceived, or which was based on perceptual evidence". Such constructions typically translate into English as 'X saw that "Y" [clausal deduction]', but always entail actual visual perception at the source (i.e. visual evidence is the source for the deduced/projected thought). A Gooniyandi example with *mila-* 'see' projecting a direct quote is:

(68)	*yoowooloo-ngga*	*-nyalimila*	*winbidda*	*boolgawoolga-ngga*
Goon	man-ERG-REP		they:saw:them	old:men-ERG

aa	*ngamoo*	*girli*	*boolgawarri*	*garingi*	*ngangbada*
ah	before	same	he:is:getting:old	wife	we:will:give:him

'The old men would see "he's getting old, we'll give him a wife"'.

Other languages which have similar constructions with the 'see' verb are Mangarrayi and Ungarinjin. Given that, in European languages, such deductions on the basis of visual evidence or visual recognition are the typical precursor to extensions of 'see' into cognition uses without any entailment of visual perception, it is significant that this relatively common construction in Australian languages does not appear to give up its perception interpretation very easily.

Only three Australian languages that we know of have some evidence of 'see' developing to 'know' or 'think' without first passing through 'recognize', as in the Ngalakan case. All three cases, however, are not straightforward and present problems of interpretation. First, the Kaurna language, spoken around Adelaide and long virtually extinct, uses *nakkondi* 'to see, look; to know', but the peculiar sociolinguistic situation here — in particular, the embedding of the verb *nakkondi* in Aboriginal English over a lengthy period — means it may have come under influence from English semantics. Second, Guugu Yimidhirr *nhaamaa* has the semantic range 'see, look, hear, think', but we cannot tell whether the development to 'think' was from the 'see' or the 'hear' sense. In support of the hypothesis that 'think' developed from the 'hear' sense of this form, we would note that when the verb is compounded with the form for 'ear', *milga*, to give *milgan nhaamaa*, the resulting meaning range is 'listen, remember, think'. Finally, in Arrernte, the verb *itele-areme* 'know; realise; remember; think; understand' is originally a compound formed from *ite-le* 'with the throat' and *areme* 'see; look for; meet; visit' (i.e., literally 'see with the throat'). As noted in §3, such compounds can be problematic because one does not know whether the semantic extension is a property of the perception verb, the compounding element or the unified compound. In the Arrernte case, there is good reason to believe that it is the element *ite* 'throat' which is primarily responsible for the cognition reading of the compound. For one thing, the common verb for 'to think', is a simple intransitive verb derivation with the inchoative suffix, *-irre*, added to *ite* 'throat' : *itirreme* 'think; think about; think that; worry'. As Henderson and Dobson (1994:426) note "[i]n Arrernte, the throat is involved in certain expressions that involve thinking, wanting and some similar feelings" (see also Van Valin and Wilkins 1993: 523-524). There is no other evidence of 'see' or 'eye' extending into the domain of cognition in Arrernte, although as we have shown in §5.4.1, both these notions have extensions into the realm of social interaction.

5.5 'Smell', 'taste' and 'touch'

In a very few languages 'smell' has limited cognitive extensions: Nunggubuyu *yarra-* 'to smell (something)' can also mean 'to detect, to sense (something)'. Two languages that appear to have shifted the meaning of the 'smell' etyma **bany-rdi* and **nuuma-* (PN *nyuuma-*) (see §4.1.2.3 above) are Paakantyi: *parnta-* 'to search, to look for, to come out', presumably via 'sniff out', and Wemba-Wemba *nyuma-* 'to recognize, know' and *nyumila-* 'to think', presumably via 'recognize by smell' with later generalization to 'recognize' and 'know'.

The remaining two senses, 'taste' and 'touch' have no significant extensions into the cognitive domain in Australian languages.[33]

5.6 Overview of the trans-field extensions from perception to cognition

To summarize the main finding of this section, we have shown that, within Australia, 'hearing' is the only perceptual modality which regularly maps into the domain of cognition throughout the whole continent. The evidence gathered here speaks against Sweetser's (1990:43) suggestion that "hearing is connected with the specifically communicative aspects of understanding, rather than with intellection at large." In Australia, where 'hear/listen' regularly extends to 'think', 'know' and 'remember', as well as 'understand' and 'obey', we find a pattern which is very distinct from the European one. The novelty in Australia is for a verb meaning 'see' to develop a trans-field usage meaning 'know' or 'think'. When 'see' extends outside of the domain of perception, it most commonly shifts into the domain of social interaction where it gives rise to verbs in four distinct semantic sub-domains: (i) desire and sexual attraction; (ii) aggression and negative social interaction; (iii) supervision and overseeing; and (iv) meeting and visiting. Even where 'see' does make a move towards the realm of cognition and intellection, it rarely loses its moorings in strictly visual perception. Thus, we have seen that it commonly takes on a 'visual recognition' reading, and also a deductive or "projected thought" use, but only where the cause of "projected thought" is rooted in visual perception. Of the few examples we've managed to gather of 'see' to either 'know' or 'think', a majority are indirect (derived) shifts, and the only case of a direct (polysemous) shift which does not have a question of interpretation hanging over it is the use of Warlpiri *nyanyi* 'see' with a judgment or evaluation sense when used with a state-of-affairs complement ('think/consider/reckon X to be good/bad').

The major patterns of extension found for the 'hear' and 'see' are replicated in extensions from 'ear' and 'eye' respectively. That is to say, direct and indirect trans-field extensions of 'ear' are most often into the realm of cognition and intellection, while those of 'eye' are most commonly into the domain of social interaction.

As Sweetser would predict, the three lowest modalities on the perception verb hierarchy are even more limited than 'see' when it comes to the extent to which they map into the domain of cognition. There are some few examples where 'smell' extends to 'know' and 'think', probably via a 'recognize by smell' usage. There are no examples of verbs of cognition arising from 'taste' or 'touch'. That is to say, in Australia, it is only

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[33] This applies to the meanings 'touch (with one's skin)', but there is one possible extension of 'feel (proprioceptive)' to 'ponder', as suggested by the gloss Hansen and Hansen (1991) give the Pintupi verb *miranu* 'felt; perceived; pondered'. However, it is clear that they are treating this as homophonous with respect to *miranu* 'saw; witnessed; observed'. It is likely, however, that these should be treated as the one form with related meanings, given the following glosses for the cognate form in other Western Desert languages: Pitjantjatjara/Yankunytjatjara *mirani* 'view; watch; witness something happening', *mira-mirani* 'watch, keep an eye on something'; Ngaanyatjarra *mira-* 'gaze, to watch carefully'; and Kukatja *mirala* '1) wait; 2) feel (emotions); 3) feel (bodily sensations); 4) keep lookout for; 5) touch'. It would appear that the original meaning of this verb has to do with visual perception and that it has extended to 'feel (proprioceptive)'. Thus, it is not obvious whether the 'ponder' meaning in Pintupi extends out a 'visual' perception reading or a 'feel (proprioceptive)' meaning (or even a 'touch' or 'wait' meaning).

those perception verbs which do not involve contact which are attested as extending into the domain of cognition (with a hierarchy of 'hearing' > 'sight' > 'smell').

In the next section we show that these same patterns are reflected in evidence from other semiotic systems, and in §7 we will attempt to provide ethnographic data which will help to explain why it is 'hearing', rather than 'sight', which is linked to intellection at large. The 'anthropologists of the senses' are clearly right about cultural relativity when it comes to trans-field metaphorical mappings from 'perception' to 'cognition', even if they were wrong about relativity in the intra-field ordering of perceptual modalities.

6 Evidence from Other Semiotic Systems

In the previous sections we have concentrated on data from the everyday registers of Australian languages. However, in §1, we noted that one of the reasons Australian languages are particularly interesting and important for the general study of polysemy and semantic change is that they provide a further window on semantic relations in the form of special auxiliary registers. Typically the indigenous auxiliary registers used by Australian communities have a smaller vocabulary and concomitantly more abstract or hyperpolysemous word meanings, making them extremely useful for the study of semantic structure (cf. Dixon 1971; Hale 1971, Haviland 1979a, Hale 1982, Evans 1992a, Wilkins 1997). Evans (1992a:488) has noted that it is an open question as to how far semantic associations evidenced by other semiotic systems will parallel those of everyday language. Similarly, Wilkins (1997:414) argues that:

> everyday language is just one of a number of semiotic systems which a speech community has at its disposal, and so one should not only look to other everyday languages to provide independent documentation of a semantic association, but one should also cross-compare semiotic systems.

In this section, therefore, we will examine the extent to which data from other auxiliary registers parallels or diverges from the findings in §4 and §5. Where possible, we have examined evidence from three types of registers: respect registers, initiation registers, and sign languages.

RESPECT REGISTERS.

Many Australian languages have special respect registers used between those kin whose mutual relationship calls for, and is constituted by, respect and circumspection. In the literature these have been variously known as 'mother-in-law languages' (Dixon 1971; 1990), 'brother-in-law languages' (Haviland 1979a), 'respect registers' (Alpher 1993), 'respect vocabularies' etc. - see McGregor (1989) for discussion. In Kunwinjku/Mayali a distinction is made between *Kun-kurrng*, literally 'mother-in-law/son-in-law language', and *kun-wok-duninj* 'proper/ordinary language'.

The reduced vocabulary of respect (and other) registers results in the telescoping of a number of everyday-register words under respect terms that may be considered abstract superordinates - e.g. the collapse of the everyday Kunwinjku terms *-yo* 'lie' and *-ni* 'sit' under the Kunkurrng ('respect') term *morndi* . This many-to-one relationship can also manifest itself more extremely in what we have termed hyperpolysemy (Evans 1992; Wilkins 1997) where a single special register form covers a range of everyday terms whose meanings are linked in a mixed chain of metonymic and metaphorical links. For example, the Kun-kurrng term *kun-mimal* subsumes the four ordinary language terms *kunak* 'fire, firewood', *kun-djahkorl* 'firestick', *kun-dolng* 'smoke' and *kun-dung* 'sun'.

In the realm of perception and cognition verbs we find that Everyday Kuninjku, for example, distinguishes *-bekkan* 'hear, understand (language); feel' from *-bengkan* 'understand (generally), know'[34]; while the respect register Kunkurrng collapses both

[34] The similarity in forms is due to the fact that the etymologies for both forms involve the same basic root *-kan* 'carry', compounded with a noun - *beng(h)* means 'faculty of cognition', while *bek-* is of unknown provenance, though it may be an old assimilated double of *beng(h)*. There is some evidence that

under the term *-marrngalahme*. Thus the semantic range of this respect form is 'listen, hear; understand; know' and we see an association of 'hearing' and 'knowing' that manifests itself not in the everyday language, but in the respect register. This then, is parallel to the findings in §5.3.4, and fits with the general pattern, discussed in §3, for polysemous senses to be distinguished formally in some languages but not in others.

In nouns there is also an interesting parallel which reinforces our findings concerning the importance of 'ear' in the domain of cognition and intellection. Unlike many Australian languages, everyday Kuninjku / Mayali does not have a single form with the range 'ear; faculty of cognition and intellection', e.g. Kayardild *marralda* 'ear; faculty of hearing and cognition', discussed in §5.2. Instead, it distinguishes *kun-kanem* 'ear' from *kun-beng* 'faculty of cognition and understanding; intelligence'.[35] In the respect register, however, there is a single noun to cover 'ear' and 'faculty of understanding': *kun-mardorrk*. The respect language nominal root *mardorrk* also forms the base for a number of compound verbs denoting cognition, such as *mardorrkngukbonghme* and *mardorrkmidjarrberlme*, both meaning 'forget'.

In the Guugu Yimithirr respect language (*Guugu Thabul*), we find two pieces of evidence which confirm observations made previously. Firstly, the sense ranges of both the everyday verb *nhaamaa* 'see; look; hear; think' and the everyday verb *waamil* 'find, visit, meet' are collapsed under the single respect term *midu-ngal*. This is consistent with the association of 'see' with social interaction exemplified in §5.4.1, and especially reaffirms the association of 'see' with the subdomain of 'meeting and visiting'. Secondly, in connection with the close association of 'taste' with 'eat' and 'bite' which we noted in §4.2.4, we find, that the everyday Guugu Yimithirr verbs *baadal* 'try; taste', *budal* 'eat' and *thuumbil* 'swallow' can all be replaced by the respect vocabulary term *bamba-ngal*.

Dixon (1971; 1972), in writing about the Dyirbal respect language (*Jalnguy*), has noted that an everyday language verb and all its hyponyms will tend to be replaced by a single equivalent in the respect language. Thus, for example, the respect term *nyuriman* replaces the everyday basic verb for 'see; look' (*buran*), as well as eleven other everyday language hyponyms of 'see; look' (including *waban* 'look up at', *wamin* 'take a sneaky look'; *rugan* 'watch someone going', *gindan* 'look with the aid of a light', and so on). If necessary, the meanings of the more specific everyday hyponyms could be expressed more precisely in Jalnguy by adding modifiers or further phrases to *nyuriman*. For instance, the everyday verb *waban* 'look up' "would be expressed by *yalugalamban nyuriman*, with the verb preceded by a verbalized verb marker involving the bound form *gala* 'vertically up'. Similarly, *gindan* 'look with a light' would be rendered using the Jalnguy phrase *ngarrgana-gu nyuriman*, and this is composed of the respect form for 'light', *ngarrgana*, in the instrumental case, preceding the general verb *nyuriman*. The everyday form for 'see; look' in Dyirbal is only ever rendered as *nyuriman* in the respect language, and cannot receive a more specific description. Dixon uses these facts to argue for a distinction between 'nuclear' and 'non-nuclear' verbs, which for our purposes can be thought of as the distinction between basic superordinate verbs and their semantically more specific hyponyms. This supports the position we took earlier in the paper, of concentrating only on basic verbs of perception rather than hyponyms, and demonstrates how evidence from an auxiliary language can help shed light on the hierarchical structure of the everyday lexicon. Moreover, as Dixon argues, we can regard the respect language paraphrases of more specific, non-nuclear, verbs as definitions which provide insight into the semantic structure of particular verbs.

Although, as we would expect from our prior discussion, there is no evidence that the Dyirbal respect term *nyuriman* 'see; look' is used to cover or paraphrase notions of

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bengkan is an east-side innovation: the westerly Gun-djeihmi dialect uses instead the form *burrbun* , with deep cognates in the neighbouring Iwaidjan family (e.g. Maung *wurru* 'think, know'), eastern dialects use *bengkan* alone, while central dialects have both forms side by side.

[35] The root *beng* is found in a number of cognitive adjectives and verbs, such as *bengwarr* 'crazy' [beng-bad], *bengngukme* 'forget' [beng-shit], *bengyirri* 'be attentive' [beng-COM-stand], *bengdayhke* 'remind' [beng-stand-CAUS], *bengbun* 'make distracting noise, annoy, disturb' [beng-hit] etc. In many Australian languages, these would be derivatives of 'ear'; however, the only verb in this set based on 'ear' is *kanemdubberran* 'forget', a synonym of *bengngukme* that literally means 'ear-block-itself'.

cognition or intellection, we do find some circumstantial evidence in Jalnguy which connects 'hearing' with cognition. Dixon, in discussing the everyday Dyirbal verb *ngamba-L* 'to hear, listen to' (1990:23), notes that while it has a monomorphemic equivalent in the respect language of one of the Dyirbal dialects, in two other dialects the respect language form is a compound, *digirr-julbamba-l* (temple-put), which literally means 'to put one's temple down'. Dixon explains the connection by noting that "the temple is believed to be the location of the brain, and being able to hear properly is an important sign of intelligence."

One very important reason for including respect and initiation registers in one's comparative investigations is that terms in these registers are frequently cognate with terms in the everyday register of other languages.[36] For instance, in Guugu Yimithirr the everyday terms *nguyaarr* 'a dream' and *nguyaarr-ngal* 'to dream' are replaced in the respect language with *bitharr* and *bitharr-ngal* respectively, and it is the respect forms, not the everyday forms, which are cognate with the first element of the everyday Yidiny forms *bijar+baja*-L (dream-bite) 'to dream v.t.' and *bijar-wanda*-N (dream-fall) 'to dream v.i.'. Interestingly, the Guugu Yimithirr everyday form for 'dream', *nguyaarr*, is cognate with the first element of the everyday Yidiny forms *nguyarr+gada-N* 'to think about v.t.' and *nguyarr+wanda-N* 'to think about v.i.'. In other words, both the everyday and the respect language forms for 'dream' in Guugu Yimithirr have cognates with Yidiny everyday forms: the respect form is a full cognate and the everyday form is a semantically shifted cognate. This association of 'dream' and 'think', in part, parallels the Yukulta data discussed in §5.3.3 which evidenced a semantic association between 'hear, listen', 'think' and 'dream'.

INITIATION REGISTERS.

A second type of special register is that taught to ceremonial initiates in certain Australian communities as part of the process of formal religious education; notable examples are the Demiin register of Lardil (Hale 1973, 1982; Hale and Nash 1997) and the *Jiliwirri* register of Warlpiri (Hale 1971).

The Demiin register is clearly the most extreme case of semantic abstraction and hyperpolysemy in Australian languages, collapsing all the distinctions of everyday Lardil into a vocabulary of less than two hundred terms of great abstraction. For example, the whole nineteen-term pronoun system collapses into a two-way contrast between *n!aa* '(group containing) ego' and *n!uu* 'other'. In other cases long metonymic chains are involved (Evans 1992a). Unfortunately we have little relevant information on verbs of perception and cognition in Demiin, other than the interesting collapse of Lardil *merri* 'hear, listen to; obey, heed' and *kalka* 'be sick, sicken, feel pain, hurt' under the single Demiin lexeme *kuuku*. In §4.2.2 we discussed the common semantic association of 'hear' and 'feel (proprioceptive)', and this collapse in Demiin is consistent with that observation; in fact, Hale and Nash (1997:248) gloss *kuuku* as 'hear; feel'.

The Jiliwirri register of Warlpiri is based on the principle of antonymy: words (but not inflectional affixes) from the everyday language are replaced with their 'antonyms'. Hale (1971:473) notes that Warlpiri men say "that, to speak *tjiliwiri*, one turns ordinary Walbiri 'up-side-down'". As the following example shows, to convey the proposition 'I am sitting on the ground', one must use a Jiliwirri utterance which would translate literally into everyday Warlpiri as 'someone else is standing in the sky'.

(69)	[ordinary Warlpiri]	*ngaju*	*ka-ma*	*walya-ngka*	*nyina-mi*
		I	PRES-1sg	ground-LOC	sit-NPST
	[Jiliwirri]	*kari*	*ka-ø*	*nguru-ngka*	*karri-mi*
		other	PRES-3sg	sky-LOC	stand-NPST

'I am sitting on the ground.'

[36] In fact, the respect forms can also be semantically shifted senses of everyday forms used by the same community. For instance, in Guugu Yimithirr, the everyday form *milga* 'ear' is replaced in the respect language with *$thuba*. In the everyday language, *thuba* means 'mushroom; sponge' and the shift to 'ear' in the respect language is a metaphorical extension.

Hale (1971) uses the set of Warlpiri perception verbs to exemplify how Jiliwirri practice can help to reveal aspects of the abstract semantic structure of a coherent lexical subset. He treats the three everyday terms *nya-* 'see'; *purda-nya-* 'hear; feel' and *parnti-nya-* 'smell' as forming a lexical subfield. We have discussed these terms extensively in previous sections, and will only remind the reader that the 'hear' and 'smell' forms are derived by adding a preverb to the form for 'see'. In Jiliwirri there are no available verbs that function as antonyms for these three terms, either within the set, or outside it. For instance, unlike 'sit' and 'stand' which can function as antonyms to one another, as shown by example (73), 'hear' cannot function as the antonym of 'see'. As Hale writes "the three verbs cannot themselves be contrasted with one another in a way which is obviously consistent with the principle of minimal opposition." To get the 'opposites' of these forms in everyday Warlpiri, one must use strategies of negation (to form 'not to see'; 'not to hear' and 'not to smell'). However, Jiliwirri has a general convention that negatives may not be used to create opposites. Just in the case of the perception verbs, therefore, Jiliwirri resorts to the creation of special forms, leading to the following set (see Figure 13). Note, that according to the principle of antonymic usage, the everyday set of perception terms are used in Jiliwirri to convey their opposites 'not see', 'not hear' and 'not smell'.

yurduyurdu-jarri-	'see'	*nya-*	'not see'
jutujutu-jarri-	'hear'	*purda-nya-*	'not hear'
rdulpu-rdulpu-jarri-	'smell'	*parnti-nya-*	'not smell'

Figure 13: The six perception verbs in the Jiliwirri initiation register of Warlpiri

As Hale (1971:479) observes, "the internal cohesion of the domain is preserved in the form of the *tjiliwiri* coinages — i.e., all share the morphological peculiarity that they are composed of a reduplicated root preposed to the verbal formative" *-jarri* (the inchoative). At the time of his 1971 article, Hale could give an everyday meaning to the root of only one of the three Jiliwirri perception verbs: i.e., he noted that *jutu* "refers to stoppage, closure, and to deafness". With all the work that has been done on the Warlpiri lexicon in the past 25 years, it is now possible to add that the everyday meaning of *yurdu* is 'averted gaze; turned away from' and that of *rdulpu* is 'stuffy; suffocating; stuffed; blocked' (note also the fixed phrase *mulyu rdulpu* 'blocked nose'). In other words, the roots of all three Jiliwirri perception verbs are nominals which, in the everyday language, describe the organs of perception as being in a state where they are unable to perform their normal sensory function (i.e. they are blocked, damaged or averted).

The fact that the everyday forms for 'hear' and 'smell' are both based on the form for 'see' in Warlpiri might have led readers to wonder whether these forms are really better analyzed as hyponyms of the 'see' verb, and maybe *nya-* would be better glossed as 'perceive' rather than 'see'. However, the Jiliwirri facts help to establish that these three perception verbs are all at the same level of semantic specificity within the same semantic field, and that *nya-* really is to be understood as primarily meaning 'see' when used on its own. Moreover, as we have seen, Jiliwirri also reveals that the domain is not structured in terms of minimal opposition. So, at the same time as it reveals a gap in semantic structure (i.e., everyday perception verbs don't have lexicalized antonyms), Jiliwirri provides evidence for the existence and structure of a semantic field that would not be so easy to establish on the basis of the ordinary language.

The secret nature of ceremonial knowledge in Aboriginal society might suggest that the semantic system of initiation registers would not always parallel that of the ordinary system, but it must be borne in mind that "[a]though certain knowledge is restricted to a few people, there are constraints on what that knowledge should be: what is known most widely and what is logically possible within the system of meaning both act as constraints on the content of the more restricted categories" (Morphy 1991:94). Morphy discusses a number of cases illustrating "the proximity of secret to public knowledge and the opportunity for deduction available to uninitiated men and women", and he argues that this "illustrates an intent on the part of the initiated men that women should be able to

understand and share in knowledge of the ceremony" (ibid:90). Keen (1994) has shown similar parallelisms with respect to dance and the construal of ceremonial meanings.

SIGN LANGUAGE.

Many speech communities, particularly in Central Australia, have highly developed systems of sign language (Kendon 1988). These are typically used by non-deaf individuals. The most elaborated sign language usage is found among older Warlpiri and Warumungu women, and is associated with the speech taboo which "widows" in those communities are placed under during the period of mourning (which can last up to one year). However, in many Central Australian communities, all members of the community know and use some (reduced set) of handsigns and signed sentences on an everyday basis, especially in contexts where speech is socially undesirable or impossible. Speakers can readily associate handsigns with everyday language glosses, making the comparison of the auxiliary sign language and the everyday language feasible. As other authors have shown (e.g. Strehlow 1978; Kendon 1988; Wilkins 1997), auxiliary sign use provides clues to semantic structure in two main respects. First, one handsign often corresponds to several semantically related everyday language terms and, as a result, specific ('non-nuclear') everyday terms will be paraphrased ('defined') in the auxiliary sign language with several signs. Secondly, the visual medium of signs allows one to observe very directly the iconic or motivated properties of a handsign or signed utterance.

Kendon (1988: 171-172) discusses Warlpiri signs which involve pointing to the ear or ears, and notes that the manner of pointing varies in a motivated fashion and is revealing of semantic contrasts in the domain of cognition. He observes that many of the signs which point to the ear "relate to the referent indirectly, for the ear now stands for 'channel of understanding'". Close observation reveals that in signs which express effective, positive cognitive functioning — "that is, such meanings as 'wise', 'knowing', 'understanding'" — the pointing shape which approaches the ear is a form of horned hand with index finger and little finger extended, and ring and middle finger drawn in. This same handshape is also used to indicate the notion of "going" or moving freely through space, and might here be taken to indicate that information is moving freely, or that the channels of intellection are open. By contrast, "if the meaning is negative — such meanings as 'senseless, crazy', 'forget', and the like — the hand is a flat (B) which here, perhaps, suggests that the ear is blocked or covered."

The signing of notions relating to the domain of cognition in the region of the ear is very common in Central Australian communities. For instance, with respect to the Kukatja, Peile (1997:50) writes:

> In sign language, a person who points to his ear usually with his right hand, palm forward and outstretched fingers together, is expressing that he knows what a person is speaking about or that he understands the matter under discussion.

Wilkins has recorded a complex Arrernte handsign in which the Arrernte verb *alkngwirreme* 'to forget' is rendered using a sequence of three signs. The first sign is a loose hand, index finger trace around the ear, which variously signifies 'understanding; hearing; information', The second sign is the sign for 'to leave' and the third sign is the sign for 'to disappear'. In other words 'forgetting' is rendered in sign as 'understanding/information leave and disappear'. This is of special interest, since the everyday language form for 'forget' is likely to have originated as a compound involving *alknge* 'eye' and *uyirreme* 'to disappear' (i.e., *alknge-uyirreme*). That is to say, while both the everyday Arrernte form and the auxiliary sign form seem to be premised on the notion of 'disappearing', the former incorporates the 'eye' while the latter incorporates the 'ear'.

Adam Kendon has kindly provided his database of Central Australian signs for us to search. This database contains approximately 1600 entries and is Kendon's entire collection of verified signs collected during fieldwork in 1978, 1981, and 1984-1986 at Yuendumu (Warlpiri), Ti Tree (Anmatyerre), Neutral Junction (Kaytej), Tennant Creek (Warumungu and Warlmanpa), and Elliott (Djingili and Mudbura). We first did a search

for signs enacted in the ear region and the eye region. Our purpose was to gather any body-part, perception, cognition, social interaction and emotion readings which were associated with these signs (other meanings, such as animal names, were ignored). Signs enacted in the region of the ear had the following meanings:

ear	hear	understand
wise, knowing	ponder, solve, think out	know
deaf	without understanding	crazy, senseless, temporarily insane
unaware, ignorant of	be unknowing	heedless
lose	forget	

By contrast, signs enacted in the eye region have the following meanings:

eyes	eyelid, eyelash	tears
bunged up eyes	blind	cry, weep
grief for the deceased	brave, not crying	frown
be wild and furious	fall asleep	sleep
squint	fail to recognize someone	peer
conceal, cover something		

The results are obvious: signs in the region of the ear most commonly take on cognition and intellection readings, while signs in the region of the eye tend to have emotion or perception readings (cf. §5.2). Note, however, that 'see' is not in this list. This is because signs for this notion tend to be enacted with a 'V'-fingers shape in neutral space. A search for signs with this handshape revealed the following collection of notions:

see it, sense it	to see, to look	object of perception (e.g. picture, video, screen)
look for something	look after something	look around
recognize,	not recognize	

Once again, beyond the notions 'recognize' and 'not recognize' (cf. §5.4.2), we do not find any notions in this list which could be construed as belonging to the domain of cognition.

OUTCOMES

While it is logically possible for the different special registers to have independently structured semantic systems, in fact we find that the semantic connections represented in the various respect registers, initiation registers and sign languages which we've been able to examine in this section are completely consistent with our earlier findings based on everyday language data. We have found evidence which supports both our intra-field findings within the domain of perception verbs (e.g. the association of 'hear; listen' and 'feel (proprioceptive)' evidenced in the Demiin initiation register), and our trans-field findings concerning mappings from perception to cognition. Indeed, the sign language data strongly reinforces the now familiar association of 'ear' and 'hearing/listening' with cognitive notions like 'understand', 'think' and 'know', and further helps to confirm that 'eye' and 'see' have little to do with cognition and higher intellection. Importantly, we have been unable to find any data from other semiotic systems which would contradict the earlier findings. Moreover, the data from the Warlpiri initiation register, Jiliwirri, and the Dyirbal respect register, Jalnguy, help to shed light on the internal semantic structure of the perception verb domain in Australian languages, and provide some motivation for a couple of assumptions we've made in this paper (such as the presumed unity of the semantic domain, and the distinct treatment of superordinate verbs and hyponyms).

7 Why does 'hearing' rather than 'seeing' give rise to cognitive verbs?

In this section we ask why Australian languages recruit cognitive verbs from hearing, where Indo-European gets them from verbs of seeing. As we noted in §3, bridging contexts and the inferences they generate are the precursor to conventionalized polysemy. Below we discuss seven cultural factors which are likely to generate the sort of communicative context in which a verb for 'hear/listen' would, by pragmatic inference, gain a more abstract cognitive reading such as 'think', 'know' or 'remember'. The following hypotheses are not meant to be mutually exclusive: rather, we believe that they are mutually reinforcing in the sense of providing a series of convergent factors all pushing semantic developments in Australian languages in the same direction. An eighth, and obvious, hypothesis would be that the prevalence of particular extensions of 'hear' is an areal phenomenon, calqued from language to language. While we believe this is a likely explanation in many cases, we do not treat it below for the simple reason that it would leave unexplained how the phenomenon arose in the languages from which it was diffused.

Before considering these various explanations we need to point out a further possibility that we will not be considering: that different perceptual verbs are sources for cognition verbs because different meanings of 'think', 'know' etc. are involved. While some semantic traditions (e.g. Goddard & Wierzbicka 1994) postulate 'think' and 'know' as semantic primitives, and hence invariant across cultures, it remains possible that there is no one-to-one semantic correspondence between the English verbs and those in Australian languages. For some Australian languages one might venture to argue that 'know' could be defined, for example, along lines like 'because of what I have heard, I say: X; because I heard it from the right people, I can say: X is true'. Similarly 'think of X' might best be defined as 'X is not here; I do something with my ear which is like hearing X; it makes me want to say: X is here'. Mutatis mutandis, one might seek to define 'know' and 'think' for Indo-European languages through the verb 'see'.

A hint in this direction comes from Keen's (1983) gloss of the Yukulta verb *marrinymarrija* 'to dream of/think of someone (i.e. to tune into their vibrations)'. As discussed in §5.3.3, this gloss suggests that 'thinking of' is conceptualized in Yukulta less in terms of generating an internal representation and more in terms of tuning in to an object with an external existence, which would probably give rise to a different definition of 'think'.

Although this more relativist position would be coherent , and would readily account for the different semantic pathways we find, no linguist has done the careful semantic analysis or attempted to elaborate definitions along these lines and subject them to the testing of careful paraphrasing with native speakers that would be necessary to defend this position. We therefore leave it as an untested possibility, and instead try to use ethnographic data to account for different pathways leading to the presumed translationally equivalent endpoint.

7.1 Hearing as the prototype of inwardly-directed attention

One reason Sweetser gives for the dominance of sight-verbs as a source for cognitive verbs is their supposed greater amenability to direction of attention:[37]

> [V]ision and intellection are viewed in parallel ways, partly ... because of the focusing ability of our visual sense - the ability to pick out one stimulus at will from many is a salient characteristic of vision and of thought, but certainly not characteristic of any of the other physical senses except hearing. Even hearing is less consciously and readily focused than vision - I can literally move my eyes from one object to another, while it may require a good deal of effort to attend to one auditory stimulus among many (e.g., to the one conversation in

[37] One problem with this account is that it is the non-controlled verb 'see', rather than controlled 'look at', which develops the cognitive meanings (our thanks to John Bowden for pointing this out).

> which we are participating, rather than to the five others in the room, which are socially considered as background noise). (Sweetser 1990:38-9)

However, ethnographies of communication for Australian languages frequently stress the role of individual choice in selectively directing attention in hearing:

> In my understanding the strong tendency in Aboriginal conversations is to turn the communication channel (talk) on and leave it on; it is continuous..... In the Aboriginal setting, *where I am saying the listener has more control, members of the group can tune in and tune out of the ongoing (continuous) communication at will.....* The Aboriginal pattern of interaction can be viewed as a coping strategy: it enables an individual to opt for privacy but preserve the option to re-engage at any time. Since there are no suitable means of using the built environment to ensure personal privacy, the members of the remote Aboriginal community manipulate the pragmatic environment, keeping the communication channel continually open but only directly engaging when it is appropriate or when they choose to. (Walsh 1991:3-4; italics ours)

> ... typical Aboriginal social conditions of rather exposed camp life and highly developed etiquette of selective orientation and attention to others at any given time.... (Merlan 1989:230-1).

Compared to seeing, the act of directing attention with hearing is internal: directed visual attention can be noted from outside, through movements of the eyes or head, whereas directed auditory attention cannot be observed from outside.[38] This may motivate the use of hearing as the prototypical 'intelligent' sense under conscious control, and the metonymic extension both back from the resultant act of hearing to the attentional switch that enabled it, and forward to the act of understanding and the state of knowledge that follows it.

7.2 The role of 'vision' in interaction: Different conversational styles

The dominant forces in discourse and conversational analysis have tended to presume not only that 'conversation' is a true universal, but also that it can be universally characterized as 'dyadic' and 'face-to-face'. Work by Michael Walsh (1991), already quoted in the previous section, brings this presumption into question. He argues cogently for an important distinction between Anglo White Middle Class (AWMC) conversational style and the conversational style in remote Australian Aboriginal communities. Walsh identifies the AWMC style of talk as 'dyadic' and the style found in remote Aboriginal communities as 'non-dyadic' (broadcast). The differences between the two predominant styles are summarized below:

> *Dyadic (AWMC predominant everyday conversational style)*
> - an ideology of talking in twos
> - talk is directed to a particular individual
> - people should face each other
> - eye contact is important
> - control is by speaker

[38] Or so it is usually said. However, Peile (1997: 47) writes as follows concerning the Kukatja:
"[When referring] to a person who has keen hearing and perception, they compare [them[to an emu, Dromaius novaehollandiae, with its long neck and erect head. The emu might not have better hearing than other animals, but the way that it cautiously and attentively turns its head from side to side listening to the slightest sound, gives the appearance that it has acute hearing. A person with acute hearing is like an emu, with its head upright and turning from side to side. A person who is not so good of hearing is like an emu with its head bent over in the spinifex."

Non-dyadic (remote Aboriginal communities' predominant conversational style)
- talk is broadcast
- people need not face each other
- eye contact is not important
- control is by the hearer

We have already noted the possible consequences of a model in which "control is by the hearer" (i.e. where there is individual choice in selectively directing attention in hearing). However, two other important factors in interactional style could govern the direction in which 'seeing' typically extends: the nature of 'eye' contact and body-positioning. It is rather mildly stated to say that "eye contact is not important" and "people need not face each other". In fact, as we have already seen in §5.4, eye contact and gaze patterns which follow the European norm are considered offensive in many parts of Aboriginal Australia. A preferred seating pattern among close friends is side-by-side (or even back-to-back), and people will only be "face-to-face" if there is a significant distance between them, or they are separated by something like a fire, and even then the gaze will typically not be directed toward an interlocutor for any significant length of time. The following observations by Harris (1980: 114-115) concerning the Yolngu of Northern Arnhem Land could apply to many communities in Australia:

> For a yolngu to hold a person with his gaze can be a sign of power or can signify a bid for power. Yolngu children are discouraged by their parents from doing this. Some ceremonial rituals demonstrate one figure claiming power over another through open and direct staring. Such direct staring is sometimes thought of as a sign of *madakarritj* ("anger, belligerence"), and sometimes balanda [i.e. Europeans] who want to be "open" and friendly can be misunderstood, through the directness of their eye contact, to be claiming authority or power.
>
> There are two other features of yolngu positioning for communication that are worth mentioning, The first feature is that during large meetings, there is very little eye contact between speaker and audience, and the speaker holds forth in the midst of all kinds of audience activity, himself pacing up and down, staring at the ground, or even turning his back on the audience. The second is that yolngu are accustomed to facing away from each other during conversation in some social settings.

Harris goes on to suggest three contributing factors which may have led to this pattern of interactive behavior: (i) since much of the casual conversational interaction of the community takes place at night in poor light, people may have "adapted to conversation without visual contact"; (ii) kinship rules of avoidance and respect often demand that people in a certain relationship keep turned away from one another, even when they are conversing; and (iii) there are no social rules or contexts which promote direct face-to-face interaction. Whatever the actual reasons are for this pattern of interaction, we would suggest that it makes the gaze, and even facing to 'look' or 'see', highly socially loaded. Such a context would strongly favor extensions of 'see; look' into social interaction, and concomitantly limit their extension into cognition and intellection at large. Moreover, it seems reasonable to presume that a simple phrase like "I hear what you're saying" would be taken to provide greater evidence of direct attention (and intellection) within an interactional style where the norm is gaze avoidance rather than gaze monitoring.

7.3 Hearing as a prototypical way of perceiving objects absent from the immediate scene

It is a cross-linguistically robust observation that visual evidence is considered the most reliable indicator of an event's real status (e.g. the regular ranking of visual evidentials as higher than those of other modalities - see Willett 1988). 'I heard X', vis-a-vis 'I saw X', will therefore fail to implicate the presence or real status of X, for example if 'heard' is taken as a metaphor for perception-like behavior where X is apprehended to consciousness despite its physical absence.

This is supported by the not uncommon occurrence of demonstratives in Australian languages with semantics like that of Dyirbal *ngala-* 'not visible; either audible or remembered'.

Another way of viewing the difference between Australian and Indo-European patterns here is to see the two cultural groups as placing different bounds on when 'see' and 'hear' can be used in a non-literal sense. English and other Indo-European languages readily relax the reality requirement, allowing the use of 'see' for 'mental vision' in sentences like 'I can still see my grandmother's wrinkled old face looking at me the day before she died'. Australian languages are not reported as being able to relax this requirement for 'see', but do it for 'hear' as with many of the 'remember' and 'know' examples we have discussed in §5.

7.4 Different common scripts: knowing the way, knowing the country

Another possible explanation is that particular patterns of lexicalized polysemy reflect the frequency of textual exemplars allowing the corresponding contextual extensions. In the Australian context we might appeal to the frequency both of the practice of learning about country, tracks and routes, and mythological knowledge by hearing them recounted in stories and 'songlines'. A representative quote is:

> 'Tywerrenge and songs come out of the body of the country. ... We're not like whitefella who can take a photograph and say what pretty country it is; we've got the song to sing for that country.
>
> The country has got sacred sites, that stone, that mountain has got dreaming. We sing that one, we've got the song.
>
> Country where we live we've got to show, and country with the song. We've got to follow the line from a long way, from Port Augusta... Country is nothing else but culture.' [Wenten Rubuntja in Green ed. 1988]

The frequency of this cultural practice then engenders a second-order frequency of texts in which knowledge and memory is reported in terms of 'hearing (+>[39] names of) places', 'hearing (+> names of) ways' and so on, making utterances furnishing bridging contexts, along the lines of (64) and (65) above, common enough to serve as templates for lexicalizing this extension.

Further, it is especially in the context of relations to country in which Australian Aboriginal belief systems do not emphasise seeing as giving understanding or knowledge. In discussing Aboriginal art, Sutton (1988) argues that for Aboriginal Australians "there is no geography without meaning or without history. .... The land is already a narrative — an artifact of intellect — before people represent it." Knowledge of country is considered to be one of the defining features of intelligence and accumulated wisdom in Aboriginal communities, but one cannot know anything "deep" or important about country by sight; all the relevant knowledge is accumulated by 'hearing' and assimilating names, Dreamtime stories, songs, history and lore. Therese Ryder, an Arrernte landscape painter in what has become known as the Hermannsburg (or Namatjira) tradition, speaks about the difference between Arrernte and European watercolorists as follows:

> When whitefellas look at Aboriginal country and paint it they see it differently, and they see the land and paint it exactly as it is. When Aboriginal people look at the country this is what happens. This is really the country, and there is an important story in the rocks and rivers. They follow the Dreaming history story as they paint. They think about it as they paint, "This is really important place." Aboriginal people have a lot of knowledge when they are painting the country. Whitefellas are ignorant about country: that's just nothing to him. But he just puts the landscape what he sees in front of him. The way we see it, it's a big thing to paint country. We look at the country and the hills, and put these things, which have really important meaning, in the paintings. The earth itself is a part of us. You feel real proud and happy. (in Green 1992:290)

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[39] Following standard practice we use the symbol '+>' to mean 'implicates'.

7.5 'Hearing' and 'Spirit' in the process of socialization

Several ethnographic works concerning Western Desert language communities have observed that an understanding of the term *kulini* 'to hear; to listen; to obey; to understand; to think' is critical to an understanding of traditional views concerning the socialization of children into adults. For the Pintupi, Myers (1986) links this notion to the child's need to develop an ability to attend to the social fabric of kin relation and learn one's responsibilities to heed and obey appropriate countrymen. He writes (107-108):

> In Pintupi theory, this development is perceived as an increasing ability to "understand." Young children are said to be "unaware," "oblivious," or "deaf" (*patjarru* or *ramarama*) and therefore not responsible for their actions.... Small children are "unheeding" (*ramarama* [deaf]) in that they do not comprehend the importance of social events; rather, they throw tantrums, do not listen to or respond to parents, sit too close to an affine, play with fire, and so on.
>
> ...
>
> What children acquire socially is awareness of others. In the Pintupi view, the concepts "thinking," "understanding," and "hearing" are expressed by a single term, *kulininpa*, which means literally "to hear." The organ of thought is the ear, but emotions take place in the stomach where the spirit is located. To be unaware (*patjarru* or *ramarama*), contrastingly is to have one's "ears closed." Young children do not process the available information about who is present and what is happening. Those who do are said to "know" (*ninti*) or "to understand" — implying that one learns what responses are held to be appropriate for various situations.

In a workshop with Pintupi teachers which was aimed at exploring Pintupi views of education and schooling, Keefe (1992) had the teachers choose what they felt to be the key notions of Pintupi education. The following five terms were chosen (129):

ngurra	camp, home, place, land, country
walytja	kin, countrymen, one's own, belonging to
tulku	songs, ceremonies, objects from the Dreaming
kulintjaku	to hear, to listen, to think
nintirrinytjaku	to understand, to become knowledgeable

As Keefe writes, these "are words that unlock a world of meaning on Pintupi ideas about the person, the culture and the total education process." He observes that while the first three terms cover the significant content for Pintupi "curriculum", the last two terms focus on the process - through the process of 'listening-heeding-thinking' embodied in *kulin-tjaku* (hear-purposive), one attains the end point goal of 'becoming knowledgeable and gaining understanding' which is embodied in *nintirrintytjaku* (knowing-become-purposive). Traditionally, the three identified content areas certainly rely heavily on oral transmission (and aural pick-up), but the development of the ability to properly *kulini* 'hear; listen; obey; understand; think' like other Pintupi people is itself as critical to maturing and taking one's place in society as is the accumulation of information from the content areas.

The above quote from Myers makes reference to the 'spirit', and in much of Western Desert belief the spirit (*kurrunpa*) is linked with maturation, sense of purpose, cognition and the assimilation of information. For another Western Desert group, the Kukatja, Peile (1997: 92-93) writes that there are three stages of the spirit. A first stage is when the fetus is animated by a Dreamtime spirit, and this spirit is "then thought to develop within the human body, a belief underlined by the distinction the Kukatja make between the spirit of a small child and that of an adult." This is relevant to our discussion, because the spirit is centrally involved in intellection and is nurtured by what comes in through the ear, not by what comes in through the eye. The spirit can 'hear', but there is no evidence that it is said to 'see'. Peile (1997: 94), emphasizing the difference between the Kukatja and European views of cognition, observes that:

> in the writer's interpretation of the Kukatja view ... knowledge gained is a permanent quality of the spirit. Particular stress is put on knowledge gained by individuals, as they assume adult status in the ritual life of the community. As a corollary of this notion that life essence is enhanced by religious knowledge and ritual participation, the spirits of some individuals especially those of the tribal doctors and ceremonial leaders are considered to be more powerful than those of others. ... *The following [Kukatja statements] illustrate the fact that cognition is seen as a quality of the spirit rather than something gained independently of the spirit, such as implied in the rationalistic European view of intellection.*
>
> "The spirit become knowledgeable [*nintirrinpa*] ; the spirit understands [*kulirni-npa*] by the way of the ear [*langa-kurlu*] which is in humans. I understand [*kulirni-npa-ma*], I'm no idiot (lit. not become no good). I will have knowledge of it (my spirit will be made good)" [see example 49 above - NRDE&DPW]

In essence, then, we are talking here about a different cultural script concerning the role of audition in the socialization process, and different conceptions of what constitutes valuable knowledge, how it is assimilated, and what the role of the spirit is in effecting that assimilation. In the Western Desert, and probably in other parts of Australia, the visual takes a back seat in the socialization process. This complex of factors would be sufficient to drive a distinct pattern of extension (with associations that are encountered and nurtured from early in childhood).

7.6 Literacy vs. oracy

It is significant that the founding text for the 'anthropologists of the senses' to whom we referred at the beginning of this paper was Ong's seminal piece on the role of literacy in privileging sight as opposed to hearing, which assumes greater dominance in a purely oral culture. Ong (1969:634) argues that:

> Oral or nonwriting cultures tend much more to cast up actuality in comprehensive auditory terms, such as voice and harmony. Their 'world' is not so markedly something spread out before the eyes as a 'view' but rather something dynamic and relatively unpredictable, an event-world rather than an object world.

One might argue that developments from 'see' to 'think' and 'know' are therefore more likely to develop in literate cultures, and, conversely, that developments from 'hear' would mark cultures with a basically oral tradition, reflecting the unchallenged role of spoken transmission in acquiring knowledge.

If this were so, Australian languages should not be the only ones displaying the sorts of extensions discussed in this paper: they should be common in languages spoken in other preliterate cultures. Although some of the examples reported in Howes (1991) indicate that 'hear' can extend to 'think' in other parts of the world as well – Hausa and Ommura examples have already been discussed, and Seeger (1981) reports similar patterns in the Brazilian language Suya[40] – a widely-cast cross-linguistic study is needed to test this hypothesis carefully.

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[40] In Suya the same verb, *ku-mba*, is used for hearing, understanding and knowing. 'When the Suya have learned something - even something visual such as a weaving pattern - they say, 'It is in my ear'' (Seeger 1975:214).

7.7 Conclusion

Our survey of Australian languages has shown that in one large language family there is a consistent pattern of deriving cognitive verbs from 'hear' - both expected cognitive processes like 'understand' and 'heed/obey' and less expected ones like 'think', 'know' and 'remember' (§5). This is in spite of the general patterning of perception verbs in a way that confirms the well-known dominance of 'see' as the source of semantic extensions to other sensory modalities (§4). The trans-field mapping of perception to cognition, it seems, is much more plastic and amenable to different cultural interpretations than the intrafield extensions of perception verbs. We have demonstrated that the same domain can have its 'universal' and 'relativistic' sides; a foot in nature and a foot in culture.

Using evidence from direct extensions (polysemy) and indirect extensions (derivation and heterosemy) we were able to establish clear patterns of intrafield and trans-field change for the Australian region. As far as 'hear' and 'see' are concerned, these patterns of change are replicated by extensions involving 'ear' and 'eye' respectively. For instance, while 'hear' and 'ear' most commonly have trans-field extensions to "intellection at large", 'see' and 'eye' tend to remain removed from the domain of cognition and instead typically have transfield extensions into the domain of "social interaction". The extreme robustness of our findings was revealed by showing, in §6, that the same patterns of semantic association are also found in other semiotic systems beyond everyday language (i.e., respect registers, initiation registers and sign language). Furthermore the accumulated data is sufficient to show that the culturally-influenced trans-field semantic developments are not arbitrary: within a given culture area it is possible to find large numbers of parallel developments, and also to formulate implicational claims, such as the impossibility of 'hear' developing to 'know' without also taking on an 'understand' (or think) sense.

While we have shown that Australian languages differ from Indo-European in their pathways of semantic development, it is less clear what the causes are. We have cited suggestive ethnographic evidence on the prevalence of the ear as the metaphorical organ of cognition, the increased importance of selective attention making hearing a more conscious process, and the existence of cultural scripts that facilitate particular tropes, but this falls short of a complete explanatory account. To gain a more satisfactory understanding of what causes such different pathways of semantic development in two different cultures we must ultimately develop more sophisticated ways of documenting contrasts in cultural scripts, and better means of predicting when particular pragmatic extensions will be lexicalized. We also need, for Australian languages, much larger textual corpora that will allow us to assess how often particular bridging contexts occur, and to give us a finer grain on what precise contexts license particular extensions. Only when we possess real in-depth studies of the interaction of cultural scripts and the pragmatics of semantic extension will we be able to provide truly falsibiable hypotheses accounting for the contrasting patterns that emerge from typological studies like the one reported here.

Abbreviations for languages:

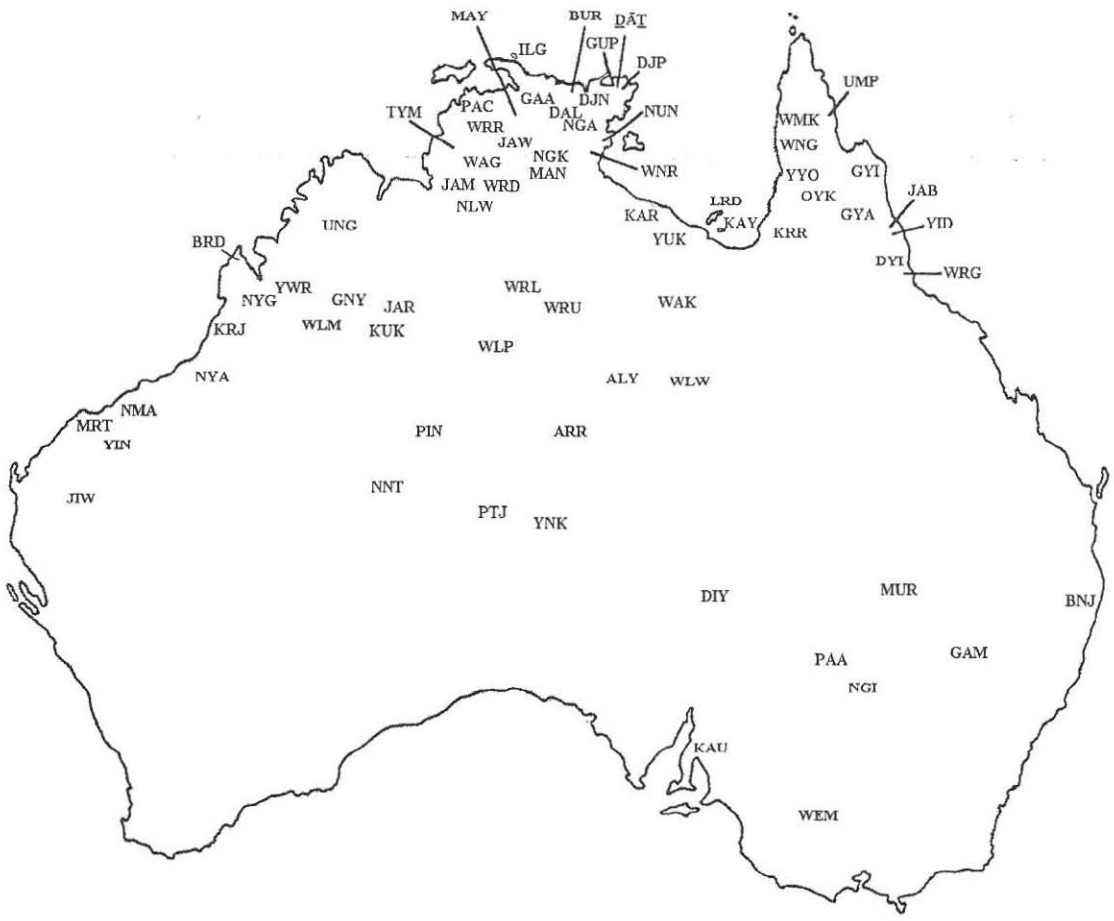
A Arrernte (Wilkins field notes; Wilkins 1989; Henderson and Dobson 1994)
D Dalabon (Evans field notes)
G Gooniyandi (McGregor 1990)
I Kuninjku (Eastern dialect of Mayali) (Garde 1995, Evans field notes)
K Kayardild (Evans 1992b, 1995, field notes)
Kuk Kukatja (Valiquette 1993)
L Lardil (Ngakulmungan Kangka Leman 1997)
M Mayali (Evans 1991, field notes)
Ngal Ngalakan (Merlan 1983)
P/Y Pitjantjatjara/Yankunytjatjara (Goddard 1994)
Ty Tyemeri (aka Ngan.gityemeri) (Nicholas Reid p.c.)
W Warlpiri (Laughren 1992, p.c.)
Y Yidiny (Dixon 1991)
YY Yir-Yoront (Alpher 1991)
KYal Kuku Yalanji (Oates 1992)
WNg Wik Ngathan (Sutton 1995)

Glosses:

ABL	Ablative
ABS	Absolutive
ACC	Accusative
BEN	Benefactive
COMP	Complementizer
CONT	Continuous
CS	Changed state
DS	Different Subject
EMPH	Emphatic
ERG	Ergative
exc	exclusive
F	Future
GEN	Genitive
IMP	Imperative
INCH	Inchoative
IRR	Irrealis
ITER	Iterative
LOC	Locative
NEG	Negative
NEG.ACT	Negative actual
NF	Non future
NOM	Nominative
NOMZR	Nominalizer
NP	Non past
OBJ	Object
PASS	Passive
PI	Past Imperfective
pl	plural
PC	Past completive
PP	Past Perfective
PRES	Present
PST	Past
REDUP	Reduplication
REFL	Reflexive
REL	Relative
REP	Repetition
RR	Reflexive/reciprocal
SBSQT	Subsequent
SEMBL	Semblative
SEQ	Sequential
sg	singular
SUB	Subordinate
SUBJ	Subject

Roman numerals I to IV refer to noun classes in Mayali and Kuninjku.
Arabic numerals refer to person values; divalent prefixes of the form 1/3 mean 'first person acting upon third person', with the number to be understood as singular unless otherwise marked.

Map: Languages in the sample



Sources and key to language abbreviations on map

LANGUAGES MENTIONED IN TEXT	Abbreviation used on map	Sources Used
Arrernte (Eastern and Mparntwe/ Central dialects)	ARR	Wilkins 1988, 1989, fieldnotes; Van Valin and Wilkins 1993; Henderson and Dobson 1994
Alyawarr	ALY	Green 1992; Yallop 1977;Wilkins fieldnotes
Bandjalang	BNJ	Crowley 1976, Sharpe 1994
Bardi	BRD	Worms 1942; McGregor (pc)
Burarra	BUR	Glasgow 1994
Dalabon	DAL	Evans field notes
Dätiwuy	DÄT	Ganambarr 1994
Demiin [Initiation register]	see Lardil	Hale 1982; Evans 1992a; Hale and Nash 1997
Diyari	DIY	Austin 1981; 1994
Djabugay	JAB	Patz 1991
Djapu	DJP	Morphy 1983
Djinang	DJN	Waters & Waters 1987
Dyirbal	DYI	Dixon 1971; 1972; 1990
Gaagudju	GAA	Harvey 1992
Gamilaraay	GAM	Austin 1993
Gooniyandi	GNY	McGregor 1989, 1990, 1994, (pc)
Gugu Yalanji [Kuku-	GYA	Oates 1992a

Yalanji]		
Gun-djeihmi [dialect of Mayali]	see Mayali	Evans 1991, field notes
Gupapuyngu	GUP	Zorc 1986
Guugu Thabul (respect register)	see Guugu Yimithirr	
Guugu Yimithirr	GYI	Haviland 1979a,b;c; ms.
Ilgar	ILG	Evans field notes
Jalnguy [respect register]	see Dyirbal	
Jaminjung	JAM	Schultze-Berndt in prep ; pc
Jaru	JAR	Tsunoda 1981
Jawoyn	JAW	Merlan n.d.
Jiliwirri [initiation register]	see Warlpiri	Hale 1971
Jiwarli	JIW	Austin 1992
Karajarri [Garadyare]	KRJ	Worms 1942;
Kaurna	KAU	Amery and Simpson 1994
Kayardild	KAY	Evans 1995, fieldnotes
Kriol		Evans (fieldnotes)
Kukatja	KUK	Valiquette 1993; Peile 1997
Kun-kurrng [respect register of Mayali]		Garde 1997, Evans field notes
Kune [dialect of Mayali]	see Mayali	Evans field notes
Kuninjku [dialect of Mayali]	see Mayali	Garde 1997, Evans field notes
Kurtjar	KRR	Black et al 1986
Lardil	LRD	Ngakulmungan Kangka Leman 1997
Mangarayi	MAN	Merlan 1982
Martuthunira	MRT	Dench 1995
Mayali	MAY	Evans 1991, field notes
Muruwari	MUR	Oates 1992b
Ngaanyatjarra	NNT	Douglas 1988
Ngalakan	NGK	Merlan 1983
Ngaliwurru	NLW	Schultze-Berndt pc
Ngandi	NGA	Heath 1978
Ngan.gityemeri (=Tyemeri)	TYM	Reid p.c.
Ngarluma	NMA	O'Grady 1966; 1979; 1990; Hale 1990
Ngiyampaa	NGI	Donaldson 1980, 1994
Nunggubuyu	NUN	Heath 1982; 1984
Nyangumarta	NYA	O'Grady ms.; 1979; 1990
Nyigina (Nyegena)	NYG	Worms 1942;
Oykangand	OYK	Sommer 1973; 1978
Paakantyi (Baagandji)	PAA	Hercus 1982, 1994a
Paccamalh	PAC	Evans field notes
Pintupi/Luritja	PIN	Hansen and Hansen 1992
Pitjantjatjara	PTJ	Goddard 1992; Eckert and Hudson 1988
Tyemeri	see Ngan.gityemeri	
Umpila	UMP	Harris and O'Grady 1976
Ungarinyin [Ungarinjin]	UNG	Coate and Elkin 1974; Rumsey 1982
Wagiman	WAG	Wilson 1997
Wakaya	WAK	Breen pc
Walmajarri	WLM	Richards and Hudson 1990
Wardaman	WRD	Merlan 1994
Warlmanpa	WRL	Nash and Hale ms.; Menning and Nash 1981
Warlpiri	WLP	Laughren 1992; Hale and IAD 1990; Warlpiri Lexicon Project ms.; Nash 1986

Warluwarra	WLW	Menning and Nash 1981
Warndarang	WNR	Heath 1980
Warray	WRR	Harvey 1986
Warrgamay	WRG	Dixon 1981
Warumungu	WRU	Menning and Nash 1981; Simpson and Heath 1982
Watjarri	WTJ	Douglas 1981
Wemba-Wemba	WEM	Hercus 1992, 1994b
Western Desert	(see Kukatja, Ngaanyatjara, Pintupi/ Luritja, Pitjantjatjara and Yankunytjatjara)	Douglas 1977, 1988
Wik-Mungkan	WMK	Kilham et. al 1986
Wik-Ngathan	WNG	Sutton 1995
Yankunytjatjara	YNK	Goddard 1983; 1992; 1994
Yawurru (Yaoro)	YWR	Worms 1942
Yidiny	YID	Dixon 1977; 1991
Yinyjiparnti	YIN	O'Grady 1966, Wordick 1982; Smythe and Thieberger 1994
Yir Yoront	YYO	Alpher 1991
Yukulta	YUK	Keen 1983

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Von 1968 an erschienen die von Prof. Dr. Hansjakob Seiler herausgegebenen Arbeitspapiere des Instituts für Sprachwissenschaft. Nach der Emeritierung von Prof. Dr. Seiler im März 1986 wurde eine neue Folge mit neuer Zählung und dem Zusatz "Neue Folge" (N. F.) begonnen. Herausgeber ist das Institut für Sprachwissenschaft.

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