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## POLYSEMY, LEXICAL CHANGE AND CULTURAL IMPORTANCE

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This article documents widely occurring polysemous equations such as *eye/face* and *seed/fruit*. The distribution of these equations across genetic and geographic language boundaries is largely discontinuous, indicating that independent invention plays a major role in their development. Lexical change through polysemy typically proceeds from unmarked to marked: unmarked words for highly salient referents such as *eye* tend to expand by absorbing low salience referents such as *face*. *Face*, however, increases in salience in languages spoken in large urban societies. Hence, *eye* and *face* are seldom equated in these languages because two highly salient referents are not usually associated polysemously. Polysemous referents are typically connected by pervasive meaning relations such as part-whole, class inclusion and likeness/resemblance.

This article presents evidence for uniform tendencies in polysemous naming and lexical change. For example, two features of the human head, *eye* and *face*, are often labelled by a single term. Indeed, nomenclatural equation of these two body parts occurs in approximately 40 per cent. of the world's languages. Other examples of polysemy documented here include equation of *eye* and *seed*, and *seed* and *fruit*. In *Luisiño*, a Uto-Aztecan language spoken in California, all three equations occur and a single term labels *eye*, *face*, *seed* and *fruit* (Bright 1968).

Several studies have identified polysemous equations that occur widely in languages (Derrig 1978; Brown & Witkowski 1981; Witkowski *et al.* 1981; Witkowski & Brown in press). While documentation of uniform tendencies in polysemous naming is of interest itself, of equal importance are frameworks of understanding that can be developed to account for them. Such frameworks can help delineate shared processes underlying human cognition.

Polysemy plays an important role in lexical change. The development of polysemy is a common means whereby languages encode new referents or alter the encoding of existing ones (Witkowski & Brown in press; Witkowski *et al.* 1981). Typically, this involves expanding a word for one referent to another when both bear a common 'meaning relation' to one another (Ullman 1957; 1962; Brown 1979a): for example, underlying *eye/face* polysemy is a relation of part to whole. In addition, other meaning relations such as class inclusion and likeness/resemblance often mediate polysemy development (for discussion of meaning relations in language, see Casagrande & Hale 1967; Lyons 1963; 1977).

Referential expansion by means of polysemy typically involves extending a

term for a high salience referent to a low salience one. Highly salient referents are usually greatly distinct in nature (Berlin *et al.* 1981) and culturally important (Witkowski & Brown in press) compared to low salience referents neither especially distinct nor culturally significant. In addition, labels associated with high salience referents are commonly 'unmarked' in languages—more frequent in use, simpler in form, and acquired earlier by children learning language than 'marked' labels associated with low salience referents (Greenberg 1966; 1975).

Evidence presented here indicates that eye is typically a high salience referent compared to face which is usually low in salience. In addition, terms for the former are regularly unmarked compared to terms for the latter. Hence, polysemy development commonly involves expansion of 'eye' terms to face rather than the reverse direction. This pattern, unmarked terms for high salience referents expanding by absorbing low salience ones, is also documented for other examples of polysemy (Witkowski *et al.* 1981).

Figure 1 indicates direction of referential extension involved in development of eye/face, seed/fruit, eye/seed and eye/fruit polysemy. Since eye is highly salient in many languages while face, seed and fruit are of relatively low salience, unmarked terms for eye show a tendency to expand and incorporate face, seed and fruit. (Seed is of moderately high salience relative to fruit, but of low salience relative to eye.). The extensions in fig. 1 that occur with high frequency are eye to face and seed to fruit while polysemy development from eye to seed and eye to fruit is less common. A low salience referent may increase greatly in cultural importance over time, thus changing in overall salience from relatively low to relatively high. When this occurs and polysemy is involved, both referents are highly salient and tend to acquire distinct labels (Witkowski *et al.* 1981). For example, it can be shown that face increases greatly in salience as societies increase in size and scale. When this happens, eye/face polysemy tends to be lost and the two referents develop separate designations.

The present study surveys 118 languages, the same set utilised in Brown & Witkowski (1981). Information is gathered from published and unpublished works describing folk systems of human anatomical terminology and from dictionary sources (see Appendix). The 118 languages are worldwide in distribution and include representatives from most of the world's major language phyla. Table 1 organises them according to genetic relationship and broadly by world area.

*Eye/face polysemy.* Table 2 lists languages which equate eye and face nomenclaturally. Parenthetical numbers are for identification of genetic affiliation by reference to table 1.

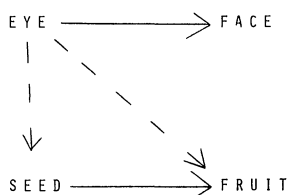


FIGURE 1. Arrows show direction of polysemy extension in languages (solid arrows indicate common extensions, broken arrows, less common ones).

If a language uses a single term to designate both eye and face, this is noted by 'eye/face' in table 2. When eye and face are nomenclaturally related in other ways, this is indicated by literal translation when possible. For example, Trique (34) has a unitary term for face and an expression for eye which incorporates the face term and translates literally, 'bean of face'. Similarly, Eddystone (58) has a unitary term for eye which combines with nose to produce a face label, literally 'nose' + 'eye'. Occasionally compound labels are not fully translatable: Aleut (1) has a unitary term for eye and an expression for face which combines the eye term with an additional element. Several languages of table 2 have optional expressions for eye or face. For example, Mixtec (33) has eye/face polysemy,

TABLE I. 118 languages surveyed organised by genetic relationship and world area.

<i>Eskimo-Aleut:</i>	Aleut (1), Inupik Eskimo (2), Nunivak Eskimo (3).
<i>Salish:</i>	Puget Salish (4).
<i>Algonkian:</i>	Delaware (5), Natick (6), Ojibwa (7).
<i>Siouan:</i>	Biloxi (8), Crow (9), Dakota (10), Osage (11).
<i>Gulf*:</i>	Atakapa (12), Choctaw (13).
<i>Iroquoian:</i>	Iroquois (14).
<i>Athapaskan:</i>	Navaho (15).
<i>Penutian:</i>	<i>Miwok:</i> Central Sierra Miwok (16), Lake Miwok (17); <i>Maiduan:</i> Maidu (18).
<i>Yukian:</i>	Wappo (19).
<i>Hokan:</i>	Achumawi (20), Diegueño (21), Tequistlatec (22), Yana (23).
<i>Aztec-Tanoan:</i>	<i>Kiowa—Tanoan:</i> Kiowa (24); <i>Uto-Aztecan:</i> Numic, Shoshoni (25); <i>Takic,</i> Luiseño (26); <i>Sonoran,</i> Mayo (27), Papago-Pima (28), Tarahumara (29); <i>Aztecan,</i> Mexicano (30).
<i>Tarascan:</i>	Tarascan (31).
<i>Mesoamerican**:</i>	<i>Otomanguean:</i> Otomian, Mazahua (32); <i>Mixtecan,</i> Mixtec (33), Trique (34); <i>Zapotecan,</i> Chatino (35), Zapotec (36); <i>Zoquean:</i> Mixe (37), Sayula (38), Zoque (39); <i>Mayan:</i> Huastec (40), Tzeltal (41); <i>Others:</i> Huave (42), Totonac (43).
<i>Macro-Chibchan:</i>	<i>Chibchan:</i> Brunka (44), Terraba (45); <i>Barbacoan:</i> Cayapa (46), Colorado (47).
<i>Ge-Pano-Carib:</i>	<i>Macro-Carib:</i> Huitoto Muinane (48), Ocaina (49); <i>Macro-Panoan:</i> Tacana (50).
<i>Andean-Equatorial:</i>	Aguaruna (51), Movima (52), Quechua (53).
<i>Austronesian:</i>	<i>Oceanic:</i> <i>Eastern Oceanic:</i> Polynesian, Hawaiian (54), Maori (55), Nukuoro (56); <i>Others,</i> Ambrym (57), Eddystone (58), Fijian (59); <i>Micronesian:</i> Kusaiean (60), Marshallese (61), Mokilese (62), Woleaian (63), Yapese (64).
<i>Northwest Austronesian:</i>	Bikol (65), Bontok Igorot (66), Manobo (67), Maranao (68), Tiruray (69), Palauan (70). <i>Papua Austronesian:</i> Muryuw (71).
<i>Indo-Pacific:</i>	<i>Central New Guinea:</i> Kewa (72), Tifal (73), Yareba (74); <i>North New Guinea:</i> Gnau (75).
<i>Australian Macro-Phylum:</i>	Pintupi (76).
<i>Mon-Khmer:</i>	Chrau (77), Katu (78), Sedang (79).
<i>Miao-Yao:</i>	White Meo (80).
<i>Kam-Tai:</i>	Lao (81), Thai (82).
<i>Sino-Tibetan:</i>	<i>Tibeto-Burman:</i> Ahi (83), Kham (84), Tibetan (85); <i>Chinese:</i> Mandarin Chinese (86).
<i>Altaic:</i>	Japanese (87), Mongolian (88), Turkish (89).
<i>Uralic:</i>	Finnish (90), Hungarian (91).
<i>Indo-European:</i>	<i>Indo-Iranian:</i> Kotia Oriya (92), Pali (93). Pahlavi (94); <i>Slavic:</i> Polish (95), Serbo-Croatian (96); <i>Baltic:</i> Latvian (97); <i>Italic:</i> Latin (98), Portuguese (99), Spanish (100); <i>Celtic:</i> Cornish (101), Irish (102), Welsh (103); <i>Germanic:</i> Dutch (104), English (105); <i>Others:</i> Albanian (106), Armenian (107).
<i>Afroasiatic:</i>	Amharic (108), Galla (109), Moča (110).
<i>Niger-Congo:</i>	<i>Benue-Congo:</i> Bantu Proper, Congo (111), Kikuyu (112), Zulu (113); <i>Cross River,</i> Efik (114); <i>Kwa:</i> Ibo (115), Yoruba (116); <i>West Atlantic:</i> Dyola (117); <i>Mande:</i> Mende (118).

\*Springer and Witkowski (1980).

\*\*Witkowski and Brown (1978b).

but also has an expression 'bean of eye/face' to refer specifically to eye. Optional labels are noted when they demonstrate a nomenclatural relationship between eye and face.

The forty-nine languages listed in table 2 comprise approximately 42 per cent. of those surveyed (49/118). Distribution of these languages is for the most part discontinuous across genetic and geographic language boundaries (cf. table 1). From this it can be inferred that nomenclatural linkage of eye and face has often developed through independent invention.

TABLE 2. Languages surveyed nomenclaturally relating eye and face.

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1.	Aleut (1): 'eye,' unknown element + 'eye' = face
2.	Delaware (5): 'eye/face'
3.	Natick (6): 'eye/face'
4.	Ojibwa (7): 'eye/face'
5.	Diegueño (21): 'eye/face'
6.	Yana (23): 'eye/face'
7.	Luisiño (26): 'eye/face'
8.	Mayo (27): 'eye,' 'eye' + unknown element = face
9.	Papago-Pima (28): 'eye,' 'eye' + unknown element = face
10.	Mexicano (30): 'eye/face' + 'stone pellet' = eye, 'eye/face' + unknown element = face
11.	Tarascan (31): 'eye/face'
12.	Mixtec (33): 'eye/face,' 'bean of face' = eye
13.	Trique (34): 'face,' 'bean of face' = eye
14.	Chatino (35): 'eye/face'
15.	Zapotec (36): 'eye/face,' 'stone of face' = eye, 'bean of face' = eye
16.	Mixe (37): 'eye,' 'eye' + 'mouth' = face
17.	Sayula (38): 'eye,' 'eye' + unknown element = face
18.	Zoque (39): 'eye/face' + 'fruit' = eye, 'eye/face' + 'skin' = face
19.	Huastec (40): 'eye/face'
20.	Tzeltal (41): 'eye/face,' 'eye' + 'forehead' = face
21.	Totonac (43): 'face,' 'bean of face' = eye
22.	Brunka (44): 'face,' 'seed of face' = eye
23.	Cayapa (46): 'eye/face' + 'seed' = eye, 'eye/face' + 'hole' = face
24.	Colorado (47): 'eye/face' + unknown element = eye, 'eye/face' + 'hole' = face
25.	Huitoto Muinane (48): 'eye,' 'eye' + unknown element = face
26.	Quechua (53): 'eye/face'
27.	Hawaiian (54): 'eye/face'
28.	Maori (55): 'eye/face'
29.	Nukuoro (56): 'face,' 'flesh/pulp' + 'face' = eye
30.	Eddystone (58): 'eye,' 'nose' + 'eye' = face
31.	Fijian (59): 'eye/face'
32.	Kusaian (60): 'eye/face'
33.	Marshallese (61): 'eye/face,' 'beside eye' = face
34.	Mokilese (62): 'eye/face'
35.	Woleaian (63): 'eye/face'
36.	Bontok Igorot (66): 'eye/face'
37.	Palauan (70): 'eye/face'
38.	Kewa (72): 'eye,' 'eye' + 'mouth' = face
39.	Tifal (73): 'eye,' 'eye' + 'nose' = face
40.	Yareba (74): 'eye,' 'nose' + 'eye' = face
41.	Chrau (77): 'eye,' 'nose' + 'eye' = face
42.	Katu (78): 'eye,' 'nose' + 'eye' = face
43.	Sedang (79): 'eye,' 'nose' + 'eye' = face
44.	White Meo (80): 'eye/face,' 'hole' + 'face' = eye
45.	Ahi (83): 'eye/face' + 'seed' = eye, 'background' + 'eye/face' = face
46.	Zulu (113): unknown element + 'eye/face' = eye, unknown element + 'eye/face' = face
47.	Yoruba (116): 'eye/face'
48.	Dyola (117): classifier A + 'eye/face' = eye, classifier B + 'eye/face' = face
49.	Mende (118): 'eye/face'

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Among the forty-nine languages of table 2, twenty-five have eye/face polysemy, a frequency of about 21 per cent. on a worldwide basis. The remaining twenty-four languages have complex constructions for eye or face or for both of these features which usually derive from a polysemy base. When both expressions are complex, there is always a common element that broadly translates 'eye' or 'face' depending on context, and a second constituent, different for each expression, that specifies designation of eye or face, respectively. For example, in Ahi (83) 'eye/face'+ 'seed' or 'seed of face' designates eye, while 'background'+ 'eye/face' or 'background of eye' designates face. Seven languages have complex expressions for both eye and face (see 30, 39, 46, 47, 83, 113, 117).

Of the remaining seventeen languages, eight have constructions for face that combine eye with mouth or nose (see 37, 58, 72, 73, 74, 77, 78, 79). Thus in these languages, located primarily in southeast Asia and Oceania, face is denominated by compounding two of its notable features. However, no language in the present sample denominates face by compounding nose and mouth. Similarly, there are no instances of nose/face or mouth/face polysemy among the 118 languages. This suggests that eye is by far the most salient feature of face.

Of the seventeen languages with complex constructions for eye or face but not both, four have complex expressions for eye, while thirteen have complex expressions for face. The preponderance of complex constructions for face compared to eye is one type of marking evidence indicating that eye is regularly more salient than face.

*Seed/fruit polysemy.* Among the 118 languages surveyed, twenty-one (18 per cent.) unite the referents seed and fruit under a single label. Languages having seed/fruit polysemy include Kiowa (24), Luiseño (26), Tarascan (31), Chatino (35), Terraba (45), Cayapa (46), Colorado (47), Tacana (50), Aguaruna (51), Quechua (53), Hawaiian (54), Marshallese (61), Yapese (64), Bontok Igorot (66), Manobo (67), Yareba (74), Ahi (83), Kham (84), Mongolian (88), Amharic (108) and Ibo (115). For the most part, distribution of languages with this equation is discontinuous across language boundaries (see table 1), suggesting its frequent independent invention.

Seed/fruit polysemy is formally similar to eye/face polysemy since both are based on the meaning relation of part to whole. That is, seeds are parts of fruit and eyes are parts of faces. An additional similarity is that eye and seed are in a sense the centre or core of face and fruit respectively, while face and fruit comprise the periphery of eye and seed. Thus formally speaking, eye and seed are to face and fruit as centre is to periphery or 'figure' to 'ground'.<sup>1</sup>

Language change evidence suggests that fruit as a foodstuff category has little antiquity in languages compared to seed. However, individual fruit names such as apple or zapote may show considerable antiquity. Sometimes these fruit names expand to label fruit in general, in addition to continuing to designate a specific type of fruit (Buck 1949: 375). Also it is not uncommon for general fruit categories to be labelled by descriptive terms which are etymologically transparent, suggesting recent coinage. In Osage (11), a Siouan language of the Great Plains, fruit translates literally 'sweet thing'. Similarly, in Mexicano (30), a

Uto-Aztec language of central Mexico, fruit translates literally 'pleasing or agreeable flower'. Sometimes a general fruit category is not listed in dictionaries, suggesting either that this category is not encoded or that it is of extremely low salience in the language.

*Eye/seed and eye/fruit polysemy.* There is a modest tendency for languages to have eye/seed polysemy. Six languages of the 118, or about 5 per cent., have this equation: Navaho (15), Maidu (18), Achumawi (20), Luiseño (26), Mazahua (32) and Galla (109). In addition, Tequistlatec (22) has an expression for grains of corn which incorporates this language's eye term, literally 'eyes of corn'.

Association of eye and seed is presumably based on the meaning relation of likeness/resemblance. Although physical resemblance between these two is not striking, there is a strong formal similarity. As noted above, eye and seed commonly participate in eye/face and seed/fruit polysemy involving both part-whole and centre-periphery relationships. Equation of eye and seed presumably draws upon and sometimes makes overt these formal similarities.

There is also a moderate tendency towards eye/fruit polysemy. Four languages of the 118 surveyed show this equation: Atakapa (12), Tzeltal (41), Pintupi (76) and Moča (110). In Atakapa the term in question designates only fruits that are small in size. In addition, Galla (109), has a figurative expression, 'eye of tree', which labels fruit. In Mayan languages of southern Mexico and Guatemala the three-way polysemous equation eye/face/fruit is widespread. Occasionally in these languages fruit is figuratively designated 'eye of tree' as in Galla (for Mayan lexical sources, see Brown and Witkowski 1979). In Tzotzil (Laughlin 1975), the typical Mayan three-way polysemy has expanded and a single term designates eye, face, seed and fruit.

In pidgin languages, which have radically reduced lexicons compared to full languages, polysemy may be especially frequent. One such language is Sango (Samarin 1967), an indigenous pidgin in the process of creolising, spoken in the Lake Chad area of central Africa, where a single term designates eye, face, seed and fruit.

Although low in frequency worldwide, neither eye/seed nor eye/fruit polysemy can be attributed to particularistic development within a restricted local area or an individual language family. Eye/fruit polysemy, for instance, occurs in languages spoken in north America, central America, Australia and northeast Africa. While eye/seed polysemy is more circumscribed geographically, occurring primarily in north and central America, one language with this equation, Galla (109), is spoken in northeast Africa. Thus the tendency to develop eye/seed and eye/fruit polysemy in languages is a regular one. It is just less strong than the propensity to create eye/face and seed/fruit polysemy.

Among the 118 languages surveyed, seven have figurative expressions for eye which translate literally 'seed of face' or 'bean of face': Mixtec (33), Trique (34), Zapotec (36), Totonac (43), Brunka (44), Cayapa (46) and Ahi (83). Although often an optional eye label (see table 2), equation of eye and seed through figurative usage is actually more common than equation through polysemy. Thus the tendency to equate eye and seed is sometimes realised polysemously and at other times through figurative expression.

*Direction of polysemy development*

To demonstrate that polysemy development regularly proceeds from unmarked to marked, two types of evidence are necessary (Witkowski *et al.* 1981). One is lexical marking. For example, it has to be shown that eye terms are commonly unmarked compared to face, seed and fruit words. In addition, it has to be shown that seed terms are typically unmarked compared to fruit labels. The second type of evidence is provided by comparative-historical linguistics. This source of evidence can directly document direction of polysemy development by showing that eye and seed words indeed tend to expand in designative range to encompass other referents (see fig. 1).

*Lexical marking evidence.* The framework of marking has been utilised in several recent studies treating the lexicon (Greenberg 1966; Kronenfeld 1974; Brown 1977; 1979*b*; Witkowski 1972; Witkowski & Brown 1977, 1978*a*; in press; Witkowski *et al.* 1981). Marking in the lexicon involves an opposition between marked and unmarked labels. Unmarked terms tend to occur more frequently in ordinary language use than marked ones, and to be phonologically and morphologically simpler. Unmarked labels also tend to be acquired by children learning language before marked labels (Greenberg 1966; 1975; Brown & Witkowski 1980). An especially important feature of marking is that lexical items unmarked in one language tend strongly to be unmarked in all languages (Greenberg 1966). Here evidence is assembled showing that terms for eye are typically unmarked in languages compared to terms for face, seed and fruit.

The marking features of frequency of use and complexity of form are closely related (Zipf 1935; 1949). High frequency is associated with short word length and thus less complexity, and low frequency with long word length and greater complexity. In the discussion of eye/face and seed/fruit polysemy, it was noted that face and fruit are often labelled by compound constructions while eye and seed seldom are. Thus by the criterion of complexity of form, terms for eye and seed are typically unmarked (simpler) while those for face and fruit are correspondingly marked (more complex).

Frequency of use counts for eye, face, seed and fruit are available from ten languages: American English (Horn 1926), Arabic (Landau 1959), Brazilian Portuguese (C. B. Brown *et al.* 1945), French (Vander Beke 1926), German (Morgan 1923), Italian (Juillard & Travera 1973), Japanese (Miyaji 1966), Mandarin Chinese (Liu 1973), Russian (Josselson 1953) and Spanish (Buchanan 1941). These languages are all spoken in large urban societies and thus may not reflect frequency counts of languages spoken in small-scale societies. In any case, words for eye are vastly more frequent in occurrence in these languages than terms for seed and fruit. Eye is also always more frequent than face, but the difference is sometimes small. Hence, by the frequency of use criterion, terms for eye are typically unmarked *vis-à-vis* those for face, seed and fruit.

However, when seed and fruit are compared, a reversal in expected frequency is found. In most of these languages, fruit is more salient than seed. Perhaps the seed/fruit reversal and the relatively high frequency of face in several languages compared to eye are artefacts of the present frequency sample. These unexpected findings suggest significant change in marking value associated with



change in societal scale. In short, we propose that face and fruit increase greatly in salience concomitant with increase in societal scale. Additional evidence supporting this proposal is presented later.

Unmarked words are typically acquired before marked words by children learning language. This is expected since unmarked terms are frequent in use, simple in form and hence easier to learn. Andersen (1978) has summarised information from English and German concerning order of child acquisition of body part terms (cf. Grant (1915); Leopold (1939); Nelson (1973) and Smith (1973)). These data indicate that eye terms are always acquired before face terms; therefore, by this criterion, eye is unmarked compared to face.

Since unmarked terms regularly label highly salient referents and marked terms less salient ones, the marking evidence outlined above suggests that eye is highly salient for all human beings. The high salience of eye compared to face is also indicated by usage patterns within languages. For example, in Huastec (40), a Mayan language of northeast Mexico, *wal* designates both eye and face and occurs as a constituent of compounds referring to bodily conditions (Brown 1971). In such compounds, *wal* always refers to eye rather than face: e.g. *maliθ in wal* translates 'inflammation of eye' not 'inflammation of face'. Unless context explicitly specifies otherwise, the referent of *wal* is understood to be eye rather than face, indicating the greater salience of the former referent.

By several different criteria of marking, then, terms for eye tend to be unmarked compared to terms for face, seed, and fruit and, by inference, the referent eye is more salient than face, seed, and fruit. On the other hand, while seed terms tend to be unmarked *vis-à-vis* fruit in small-scale societies this relationship is often reversed in large urban societies. This unexpected result will be discussed presently.

### *The natural salience of eye*

There is strong evidence suggesting that the high salience of eye is a natural phenomenon and not dependent on cultural importance. Studies of infant perception show that very early in life infants pay special attention to human eyes (Gibson 1969: 347–56). For example, Wolff (1963) reports that three-week old infants fixate on eyes in human faces. Using schematic facial representations, Fantz (1966) discovered that very young infants become fixated on an arrangement of dots in an eye pattern rather than other patterns. In another study Ahrens (1954) found that eyes are the dominant facial feature in eliciting smiles from very young infants. Around the fifth month mouth becomes important. Finally at about the sixth month infants begin to discriminate faces as wholes (Gibson 1969: 355). These studies suggest a developmental sequence whereby eyes are singled out very early as especially salient, followed much later by perception of mouth and ultimately face.

The special interest in human eyes shown by infants demonstrates the high intrinsic salience of this facial feature. As a consequence, eye is usually encoded with a highly unmarked linguistic label. Thus the natural salience of eye is converted through lexical encoding into the linguistic salience of terms for eye. This in turn is manifested through typical marking effects such as high frequen-

cy of use, simplicity of form, and early acquisition by children learning language.

Given the special salience of eye, the power of figurative naming in language is apparent in cases of the present sample which have figurative expressions rather than unitary labels as their primary designation for eye. These are Trique (34) and Totonac (43) with 'bean of face' for eye, Brunka (44) with 'seed of face', and Nukuoro with 'flesh/pulp of face' (see table 2). The notable natural salience of eye also helps explain the pervasiveness of eye/face polysemy in language and the virtual absence of mouth/face and nose/face polysemy.

*Historical-comparative evidence.* Historical linguistics provides a means for reconstructing the lexicon of proto-languages ancestral to groups of genetically related contemporary languages. Here reconstructed lexicons of several proto-languages are examined to determine direction of polysemy development. This evidence shows that change paths proposed in fig. 1 are historically attested.

Buck (1949) compiles lexical sets from related Indo-European (IE) languages noting lexical items in individual languages that derive from Proto-Indo-European (PIE). Most IE languages share words for eye which are genetically related and derive from a PIE term for this body part (Buck 1949: 225). The Ancient Greek reflex (descendent form) of the PIE proto-word for eye was polysemous and designated face in addition to eye. Thus in Ancient Greek a term for eye expanded to face. In his discussion of face and fruit words in individual IE languages, Buck (1949) notes that terms for these referents show little antiquity, often deriving from other PIE words.

Miller (1967) has assembled sets of cognate (genetically related) words from Uto-Aztecan (UA) languages and has proposed associated proto-words. Among these is a Proto-Uto-Aztecan (PUA) form for eye (*\*pusi*). As already noted, the Luiseño (26) reflex of PUA 'eye' labels face, seed, and fruit in addition to eye. In Mayo (27) and Papago-Pima (28) reflexes of PUA 'eye' designate eye and enter into compound labels for face. Similarly, the Mexicano (30) reflex of PUA 'eye' enters into compound labels for both eye and face. In two additional UA languages, Shoshoni (25) and Tarahumara (29), the PUA reflex of 'eye' designates only this body part. These UA languages demonstrate the nomenclatural priority of eye and the secondary, extended relationship of face, seed, and fruit to this core referent.

The reconstructed lexicon for Proto-Polynesian (Biggs 1979) contains a word for eye which also designates face. Thus eye/face polysemy pertained to Proto-Polynesian as it does to most of its daughter languages, see table 2 for Hawaiian (54), Maori (55) and Nukuoro (56). One Polynesian language, Nukuoro, (56) has a complex expression for eye, *ganomada*, which translates literally, 'flesh/pulp of face'. The *mada* element designates 'face' and is a reflex of Proto-Polynesian *\*mata* 'eye/face' while *gano* designates 'flesh/pulp' and is a reflex of *\*kano* 'seed' (Biggs 1979). Although currently opaque, the original designation of *ganomada* was 'seed of face', a common figurative expression for eye in languages. Expansion of 'seed' to flesh/pulp in Nukuoro seems akin to expansion of 'seed' to fruit in other languages.<sup>2</sup>

Maori (55), has two terms for eye/face. One is a reflex of Proto-Polynesian

\**mata* 'eye/face'. The second term, *kanohi*, has cognates in many Polynesian languages which alone or in compounds denote eye or eyeball. Thus it is likely that Maori *kanohi* originally referred to this body part and subsequently acquired face as a second referent. Again, expansion from eye to face is documented.

Siouan languages have a proto-word for eye and a separate term for forehead/face (Matthews 1958). In Mandan and Winnebago, two widely separated Siouan languages (Headley 1971; Matthews 1958), the Proto-Siouan word for eye expanded to face. Indeed the Winnebago reflex of Proto-Siouan 'eye' designates only face today, while their current label for eye incorporates this term and translates literally 'seed of face' (Marino 1968). These Siouan changes document polysemy development from eye to face and the attractiveness of 'seed of face' as a designation for eye.

A term for seed reconstructs for Proto-Siouan (Matthews 1958), but general fruit terms show little antiquity in this language family. Individual fruit names, however, may show considerable chronological depth. In Hidatsa, a Siouan language spoken in North Dakota, the Proto-Siouan word for plum expanded to designate fruit as a foodstuff category while retaining its original referent. In other Siouan languages terms for berry have sometimes expanded to include fruit as an additional referent (Headley 1971; Matthews 1958).

The Quechua languages of the Andean region of south America form a shallow language grouping with perhaps 1500 years time depth. There are several major and minor varieties of Quechua (see Parker & Chavez 1976; Cerron-Palomino 1976; Park *et al.* 1976; Cusihuaman G. 1976; Quesada C. 1976; Soto Ruiz 1976; Stark & Muysken 1977; Stark 1969; Adelaar 1977; Taylor 1979; Orr & Wrisley 1965). All these Quechua languages and dialects have terms for eye and seed which are transparent reflexes of Proto-Quechua \**ñawi* 'eye' and \**murú* 'seed' (Orr & Longacre 1968; Parker 1969; Taylor 1979). Several Ecuadorian dialects also extend their reflexes of these terms to face and fruit respectively (Orr & Wrisley 1965; Stark & Muysken 1977). Other Quechua languages and dialects have terms for face and fruit which vary widely and are unrelated to Proto-Quechua 'eye' and 'seed'. This evidence demonstrates expansion from eye to face and from seed to fruit in Quechua.

In Zoque (39), of southern Mexico, the expression 'fruit of face' designates eye. In related Mixe (37), a cognate of the Zoque fruit term designates seed. This suggests that the Zoque fruit term denoted seed or seed/fruit in the past, hence their expression for eye would have been 'seed of face', an expression common elsewhere. Evidently the Zoque fruit term lost its former seed designation and the expression for eye became figuratively opaque. These developments lend support to the hypothesis that seed terms tend to expand to fruit.

Evidence bearing on the development of eye/seed polysemy is provided by Luiseño (26) which expanded its reflex of Proto-Uto-Aztecan 'eye' to seed, and Navaho (15) which similarly expanded its eye word. In other Athapaskan languages words cognate with Navaho 'eye/seed' always designate eye (Hojjer 1956). This suggests direction of polysemy development in Navajo from eye to seed. Evidently when eye is figuratively equated with seed through the expressions 'seed of face' or 'bean of face', it is seed or bean which expands to eye. On

the other hand, when eye and seed are polysemously equated, eye expands to seed.

The evidence reviewed here strongly supports direction of polysemy development proposed in fig. 1. Languages typically expand unmarked terms for highly salient eye to face, seed and fruit. In addition, when only seed and fruit are involved, extension is typically from the former to the latter. Thus unmarked terms for highly salient referents commonly increase their designative range by absorbing low salience referents. Polysemous expansion, then, is another feature of marking in the lexicon. Unmarked terms regularly extend their referential range through polysemy while marked terms seldom do (Zipf 1949).

*Polysemy and societal scale.* There exists a strong relationship between societal scale and nomenclatural equation. Speakers of languages uniting eye/face and seed/fruit typically live in small-scale societies while speakers of languages not doing so usually live in large urban societies. These associations lend considerable support to the hypothesis that face and fruit have increased greatly in cultural importance and, consequently, in salience concomitant with increase in societal scale. The increasing salience of face and fruit in languages spoken in large-scale societies make polysemy less likely, since it is uncommon for two highly salient referents to be labelled by a single term (Witkowski *et al* 1981).

Marsh (1967: 338–47) provides the index of social scale utilised here (and see Witkowski *et al.* 1981: 9). Sixty languages of the 118 surveyed (see table 1) are spoken in societies that appear in Marsh (1967).<sup>3</sup> Table 3 relates societal scale and presence of eye/face polysemy in languages (see table 2). The correlation coefficient pertaining to this relationship is .70 (gamma,  $p < .05$ ,  $N = 60$ ). Similarly Table 4 relates societal scale and presence of seed/fruit polysemy in languages (gamma = .54,  $p < .20$ ,  $N = 60$ ).

Tables 3 and 4 indicate that as societies increase in scale, there is a strong tendency lexically to separate eye from face and seed from fruit. Furthermore,

TABLE 3. Association between societal scale and eye/face polysemy.

Societal scale	Polysemy	
	present	absent
High (above 7)	0	14
Medium (6–7)	2	7
Low (0–5)	12	25
gamma = .70	$p < .05$	$N = 60$

TABLE 4. Association between societal scale and seed/fruit polysemy.

Societal scale	Polysemy	
	present	absent
High (above 7)	0	14
Medium (6–7)	2	7
Low (0–5)	8	29
gamma = .54	$p < .20$	$N = 60$

since increase in societal scale has been more common than decrease through time, it follows that languages have generally moved from lexically relating these referents to not relating them. If lexical separation tends to accompany increase in societal scale, it follows that many languages spoken in large urban societies having unrelated eye and face terms at some time in the past nomenclaturally related these two body parts. For instance, Ancient Greek used a single term, *ops*, to designate both eye and face. Later in the history of Greek, complex expressions for eye and face developed, each of which incorporated the original eye/face term (Buck 1949; Liddell 1889). Subsequent change in Greek has obscured even this nomenclatural connexion between eye and face.

Societal scale is an abstract cultural attribute composed of numerous individual variables and combinations thereof (Schaefer 1969). Since societal scale is a summary variable, demonstrating that eye/face and seed/fruit polysemy are related to this general feature does not necessarily reveal the details of association. The next step is determining, if possible, the specific aspects of scale that relate to presence or absence of these polysemies. The discussion that follows suggests the operation of several factors, but others may also be influential.

The nomenclatural uncoupling of eye and face may be linked to the increased importance of cultural activities associated with facial appearance such as special cleansing, hair removal and decoration. Increase in societal scale may encourage elaboration of these activities through innovations such as the looking glass and development of fine control over colour through special techniques of dyeing, painting, staining and powdering. The mirror, of course, presents the opportunity of paying close attention to facial appearance and aesthetically orchestrating decoration through complementary colouring and other alteration. Increase in cosmetic activity may elevate the cultural importance of face as a distinct body part. With heightened importance, salience of face increases, and a tendency develops to label this body part with a term separate from and unrelated to eye.

The nomenclatural separation of seed and fruit may be similarly linked to the enhanced cultural importance and consequent increase in salience of fruit as a foodstuff category in large-scale societies, possibly related to the availability of a wide range of individual fruits due to elaborate marketing, storage and transport facilities. Many languages place major emphasis on the detailed activities involved in consuming foodstuffs and food states, rather than on food categories themselves. Most Mayan languages of southern Mexico and Guatemala, for instance, have a distinct verb for eating meat, another for eating juicy, pulpy foods (fruits), and so forth (Berlin 1967; Furbee 1972). These verbs only implicitly encode foodstuffs into general classes. Navaho (15) also has a set of verbs for eating that are highly differentiated according to foodstuffs and food states (Landar 1964). In addition, Maricopa of the southwestern United States, has separate verbs for consuming juicy and non-juicy foods. Juicy foods include fruits and a few vegetables (Frisch 1968). Thus the process of ingesting foodstuff classes is sometimes 'foregrounded' in languages, while general food categories are 'backgrounded'.

In conclusion, polysemous equations such as eye/face and seed/fruit occur widely, polysemy tending to proceed from unmarked to marked. That is, unmarked terms for high salience referents such as eye tend to expand by

absorbing low salience referents such as face. This occurs when referents bear a pervasive meaning relation to one another such as part-whole, class inclusion, or likeness/resemblance. Polysemous equations tend to develop through independent invention. This suggests that human beings everywhere perceive and categorise the world in fundamentally similar ways.

Polysemy is ubiquitous in language and its investigation has considerable potential for illuminating human cognition. In addition, the regular patterns of lexical change outlined here indicate that the lexicon is as amenable to systematic investigation as are other components of language. Most importantly, study of these regular lexical patterns can contribute significantly to knowledge of the processes and capacities which underlie human language and culture.

## NOTES

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<sup>1</sup> Other ways of relating seed and fruit may occur. For instance, both referents might be considered types of plant products or types of plant parts in certain instances. Estimated rates of seed/fruit, eye/seed and eye/fruit polysemy are probably conservative, as several records lack data on seed and fruit referents.

<sup>2</sup> In Nukuoro (56), the expression *luu mada*, literally 'the two eyes', can be used to refer specifically to the human face.

<sup>3</sup> Languages of our sample that are found in Marsh (1967), and their complexity scores are as follows: Aguaruna 0, Ahi 3, Aleut 3, Ambrym 2, Amharic 7, Cayapa 1, Central Sierra Miwok 1, Choctaw 3, Congo 6, Crow 2, Delaware 1, Diegueño 1, Dutch 5.8, English 84.6, Fijian 4, Finnish 47.5, Galla 2, Hawaiian 5, Huastec 5, Huitoto Muinane 1, Hungarian 36.8, Inupik Eskimo 0, Irish 42.7, Iroquois 3, Japanese 41.5, Kikuyu 2, Kusaiean 4, Lao 9.6, Latin 7, Luiseño 1, Maidu 3, Mandarin Chinese 13, Manobo 1, Maori 4, Mayo 1, Mende 5, Mexicano 7, Mongolian 5, Navaho 1, Nunivak Eskimo 2, Ojibwa 1, Palauan 4, Papago-Pima 1, Polish 45.8, Portuguese 29.6, Sedang 0, Serbo-Croatian 26.2, Shoshoni 1, Spanish 31.4, Tarahumara 2, Tarascan 6, Thai 13.7, Tibetan 7, Totonac 7, Turkish 23.9, Wappo 1, Yana 2, Yapese 5, Yoruba 7, Zulu 7.

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