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Examining the farming / language dispersal hypothesis

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Chapter 5

What Drives Linguistic Diversification and Language Spread?

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What is it that drives linguistic diversification? Why do languages split up into families of related languages? Why do languages spread? There have been numerous hypotheses about what causes languages to diversify, involving, among other things, migration, war, conquest, trade, technological advantage (from forms of food production, herding, navigation, metallurgy, military organization, etc.), and even divine retribution for the Tower of Babel. Communicative isolation is a commonly assumed cause, which has led to speculation about the cultural, geographical, demographic, ecological, economic, political, ideological and other factors that could bring communicative isolation about. Earlier accounts of linguistic diversification typically lacked support, but do recent proposals fare better? My goal in this paper is to examine recent claims about why languages diversify and spread in hopes of clarifying the matter. I begin with claims about the role of agriculture.

1. The farming/language dispersal model

Renfrew and Bellwood (in various publications) emphasize agriculture — the farming/language dispersal model: 'farming dispersals, generally through the expansion of populations of farmers by a process of colonization or demic diffusion, are responsible for the distribution and areal extent of many of the world's language families' (Renfrew 1996, 70). Given its impact, it pays to scrutinize this model carefully.

Renfrew (1994; 1996) came to see language spreads as due to one of four processes:

1. *farming-language dispersals* through *demic diffusion* of the farming population, the 'wave of advance model' (Renfrew 2000, 26), that in the case of early farming expansion 'implies dispersals of real populations' (Bellwood 2001, 197);

2. *initial migrations* into previously unoccupied territory;
3. *climate-related colonizations* (late climate-related dispersals into zones not suitable for habitation until the ice receded); and
4. *élite dominance* (through adoption by local hunter-gatherer groups of the new language along with the new agricultural economy, i.e. *acculturation*: Renfrew 1992, 15–16; 1994, 120; 2000, 26; cf. 1988, 438–9).¹

These 'processes' are discussed below.

1.1. Agriculture and population stability

Agriculture does not always motivate language expansions; rather, agriculture can allow a folk to stay put. Some examples of such stay-at-home agriculturalist language families are seen in Tables 5.1 and 5.2. Rather than expanding, some of these languages take a 'localist strategy', enforcing the linguistic boundaries that deny outsiders access to their resources (Golla 2000; Hill 2001a; cf. Ross 1996; 1997; Thurston 1987; 1989). Moreover, agriculture does not always lead to population pressure which exceeds of the carrying capacity of the land, forcing expansion.² Hill (2001a) asks, 'why did not Mixe-Zoqueans [bearers of Olmec civilization] expand at the expense of foraging neighbors, according to the models?' Her answer is,

a very early adoption of agriculture with a consequent sense of entitlement would have permitted Mixe-Zoqueans to develop localist sociolinguistic strategies . . . As the new technologies of cultivation permitted a sense of trust in the reliability of local resources, new 'residual zones' could form, yielding the contemporary linguistic complexity of . . . Mesoamerica (Hill 2001a, 276).

Such non-expansionist agricultural languages (see Table 5.1) go against the farming/language dispersal model.

1.2. Distribution difficulties

To test the *farming/language dispersal* model, it is important to survey the language families of the world in order to see whether they have spread significantly and whether they have agriculture. A preliminary indication of language families both with and without agriculture is given in Table 5.1, distinguished according to significant spread or not. Language families listed as 'minus agriculture' are assumed not to have had agriculture at the time of their initial dispersal.

Table 5.1 contains a significant number of spread and non-spread languages both with and without agriculture. Simply stated, this means that the farming/language dispersal model alone is neither necessary nor sufficient to explain all these distributions — no one makes such a claim.³ It is unnecessary since there are widespread non-agricultural language families, and it is not sufficient since there are non-spread agricultural languages. Therefore, other processes of spread must be invoked.

1.2.1. Exceptions and other 'processes'

We therefore need to ascertain whether the excep-

tions might be explained by Renfrew's (1997; 2000) other processes of spread: initial migrations, late climate-related dispersals and élite dominance. Since it is only spread languages which these processes address, the non-spread languages are less relevant (though an account is needed for why the non-spread agricultural languages did not spread). Among the widespread non-agricultural languages of Table 5.1, only Eskimo-Aleut, Athabaskan, Uralic (Samoyed) and Tungusic can be accounted for by one of these processes: late climate-related dispersals. The other exceptional languages are not explained by initial migrations, late climate-related dispersals, or élite dominance.

1.2.2. Linguistic diversity in agricultural zones

In zones of intensive agriculture, we often find great linguistic diversity. Agriculture in these zones has not necessarily led to language spreads, but has seemingly allowed the development and co-existence of numerous languages and language families. This calls for an explanation. Renfrew (1994, 122) relies on initial migration: 'such residual tongues, scattered in

bits and pieces throughout the world map, must have arrived in their current ranges long ago, during the initial dispersal of modern humans'. He suggests (Renfrew 2000, 27) that 'many areas with mosaic-zone language distributions have not been subjected to a farming dispersal, but rather that the initial colonization took place during the Late Pleistocene period, and that there has been stability along with local divergence since that time' (cf. also Bellwood's 2001 'friction zones').

There are two difficulties with initial migration as an explanation. First, we do not know the real history of colonization and replacement in these 'mosaic areas'. In most areas of the world, humans arrived before 40,000 BP, and by at least 12,000 BP in the Americas. Given the very large time interval since initial colonization, numerous languages could have become extinct and been replaced. Thus, reference

Table 5.1. Spread and non-spread language families with and without agriculture.

	Plus agriculture	Minus agriculture (mostly)
<i>Significantly spread families</i>	Austronesian Bantu (Niger-Congo) Indo-European Semitic Dravidian Sino-Tibetan (Chinese) Tai Chibchan Cariban Tupian Otomanguean Arawakan Cushitic(?) (pastoralists)	Tungusic Uralic (Samoyed) Eskimo-Aleut Pama-Nyungan Salishan Uto-Aztecan Athabaskan Algonquian Siouan Yuman Chon (Tehuelche, Ona) Jé family
<i>Relatively non-spread families</i>	Some 25+ Papuan families Nakh-Dagastanian Kartvelian Munda Mixe-Zoquean Mayan Totonacan Xinkan Keresan Tanoan (Kiowa-Tanoan) Panoan Isolates: Zuni, Basque, Huave, Cuitlatec, Tarascan, Chitimacha, Tunica, Natchez, Burushaski, Japanese, Korean, Sumerian, Etruscan	Some 25 N. Australian families Wakashan Tsimshian Chumashan Maiduan Pomoan Yukian Wintuan Khoi, San Chinookan Takelman Isolates: Kutenai, Haida, Alsea, Siuslaw, Washo, Yana, Esselen, Beothuk, etc.

to the time between original colonization and today's distribution of languages leaves far too much unknown and open to speculation. For example, Palaeoindians in the Great Lakes region are documented archaeologically from c. 11,000 BP, but the earliest language families of northeastern North America date glottochronologically to only about 4000 years ago: Algonquian c. 3000 BP, Iroquoian c. 4000 BP (Campbell 1997a, 104). Assuming initial immigration with Palaeoindians, we have 7000 years in which the linguistic landscape could have and probably did change in many ways.

Second, although the languages in 'mosaic zones' today may be agriculturalist, they had to have acquired agriculture sometime in their past. Reference to earliest colonization simply pushes the problem back in time: it is still necessary to explain why the first languages to acquire agriculture did not expand and swallow up others in the zone which did not yet have it, whenever the event took place. Whether agriculture is indigenous or not (Renfrew 2000, 24) seems to be a red herring — not all groups in these regions would have acquired agriculture simultaneously. For example, in Mesoamerica, agriculture is certainly indigenous, but it has also undeniably spread from one group to another so that all ethnic/linguistic groups now have it, though their language distribution seems to be mostly unaffected by this spread. To cite just one example, the linguistic evidence shows that formerly Xinkan speakers were not cultivators, but acquired agriculture from their Mayan neighbours. Virtually all Xinkan terms for cultivation and cultivated plants are borrowed from Mayan (Campbell 1972; 1997b). Thus, Xinkans maintained their distinct identity and language in face of the powerful Mayan agriculturalists, first as non-cultivators and later as cultivators, acquiring agriculture through acculturation, not as the model predicts. In short, there is also agricultural dispersal within mosaic zones, where languages are not displaced in the process.⁴

1.2.3. Small and big languages in the same territory
The agricultural dispersal model does not explain the co-existence of little languages (of few speakers or small geographical area) and large languages (widespread geographically, or of many speakers) within a region.

Bellwood (this volume, p. 21) has in mind 'agriculturalist language families [that] spread over vast areas leaving virtually no enclaves', with Bantu, Malayo-Polynesian [Austronesian] and Indo-Euro-

pean as paradigm examples. The model predicts that the expanding larger agricultural languages should swallow up the small languages in the geographical domain of larger languages. The co-existence of such smaller languages with larger ones, thus, constitutes a difficulty for the model (see Table 5.2).

In short, widespread non-agricultural cases such as Pama-Nyungan and Uto-Aztecan and non-spread agricultural cases such as the 'Papuan' language families and Mixe-Zoquean which go against the predictions are serious problems for the farming/language dispersal model.⁵

1.3. Independent events?

Even in cases which might appear to fit the model there are problems of interpretation. For example, if

Table 5.2. Larger and smaller agricultural languages in the same geographical area.

Large	Small
Indo-European	Munda
Spanish, French	Basque
Italian	Friulian
German	Sorbian
Thai, Burmese	Mon
Japanese	Ainu
Chinese	Tujia (Sibeto-Burman), Ordos (Mongolian), Oroquen (Tungusic), etc.
Kmer	Cham (Chamic)
Bengali	Khasi (Mon-Khmer)
Hindi	Malto, Gondhi, Kurku (Dravidian), etc.
Oriya (Indo-Aryan)	Mundari (Munda)
Malayalam (Dravidian)	Tulu (Dravidian)
Arabic	various Berber languages
Amharic (Semitic)	Kemant (Cushitic)
Kwa (Niger-Congo)	Mpre (Mbre)
Adamawa (Niger-Congo)	Laal
Mande family (Niger-Congo)	Pre (Bere)
Cushitic (pastoralists)	Sandawe
Yoruba	(Benue-Congo) Chumbuli (Guang branch of Kwa)
Gonja (Kwa)	Safalaba (Gur)
Yucatec Maya	Mopan, Itzaj (Itzá), Lacandon
Zapotec	Huave, Tequistlatec, Pochutec, Papabuco
K'iche'	Uspanteko, Sipakapeño, Sakapulteko
K'iche'an	Xinkan
Nahuatl	Huastec
Muskogean	Natchez, Chitimacha
Quechua, Aymara	Jaqaru, Cauqui, Puquina
Tagalog	Sinauna
Far South (Dubea, Numèè)	Caac (in New Caladonia)
Magi ('Papuan')	Yoba (Austronesian, in Papua New Guinea)
Tetum/Timorese	Buruk ('Papuan')
Kakasi ('Papuan' of Timor)	Kairui-Midiki (Austronesian)

the Indo-Europeanization of Europe and northern India took several millennia, is it really appropriate to talk of it as a single expansion or dispersal, or a single cause? Most Indo-Europeanists insist on a number of independent movements scattered over centuries to account for the distribution of Indo-European languages. (See Vansina 1995, 191 for a similar view of Bantu 'expansion'.) This telescoping of events resulting in the distribution of the languages into a single spread with a single cause does disservice to the prehistory which we are attempting to understand.⁶

1.4. *Is the New World different?*

Both Bellwood (2000; 2001) and Renfrew (2000) see the New World, with many exceptions to the agricultural dispersal model, as different from the Old World. Following Crosby (1986) and Diamond (1997), they view differences as being due to the north-south axis, the absence of large domesticated animals and the lack of major cereals apart from maize, which may explain the exceptions. This overlooks, however, the fact that the geographical orientation of Mesoamerica is largely east-west and not north-south. Bellwood (2000, 28; this volume) says that New World production systems were not so powerful as those of the Old World. But Mesoamericans had maize, beans and squash (various species), chia (*Amaranthus salvia*), sweet manioc, sweet potatoes, tomatoes, peppers, cacao, guava, papaya, mamey (zapote), Mexican hawthorn, birdcherry, prickly pear, several kinds of *Chenopodium* (epazote, guazontle, verdolaga), turkeys, muscovy ducks and caged rabbits, supplemented with foraging, with extensive irrigation systems in various areas — capable of supporting cities of large population, states and empires.⁷ The diet was not that powerless.⁸

These are insufficient grounds for setting the New World aside.

1.5. *Application of the model: Uto-Aztecan*

Stimulated by Bellwood (1997), Hill (2001b; this volume) re-interprets Uto-Aztecan (UA). She proposes a different Proto-Uto-Aztecan (PUA) homeland, in the south, postulating that PUAs were maize cultivators. This reinterpretation, however, fails to be convincing.

The hypothesis is plausible, but improbable. A southern PUA homeland, associated with Mesoamerica, would be consistent with Hill's claim of PUA maize agriculture. While reconstructed lexical evidence from PUA plant and animal terms is consistent with both the southern and the traditional

northern homeland hypotheses, the centre of gravity method (linguistic migration theory), based on minimum moves and maximum diversification, supports the traditional view, with the homeland in the southwestern US–northeastern Mexico area. Hill's southern homeland has difficulty explaining the distribution of the languages, with little diversification in the south and more in the north. Nahua (the only UA branch squarely in Mesoamerica) shows every sign of entering Mesoamerica later as a break away from its UA relatives. It underwent changes which make it like its Mesoamerican neighbours but set it off from other UA languages; it acquired several Mesoamerican structural traits (Campbell *et al.* 1986) missing from its sister languages, and it borrowed much vocabulary matching cultural traits diagnostic of the Mesoamerican culture area and its ecology, but not of the drier areas to the north (Campbell & Kaufman in prep.). These are not the earmarks of a language in its homeland whose sisters marched away to the north.

For Hill, most of the northern groups, except Hopi, lost agriculture, meaning that the argument for PUA agriculture rests heavily on Hopi evidence alone. Bellwood (1997; 2001) and Hill (2001b) assert that there are few known cases where foragers have adopted cultivation while maintaining their linguistic and ethnic integrity different from the donor community, as is assumed for the Southern UA (SUA) groups in the conventional view. But it is not true that hunter-gatherers do not adopt taming (as cases cited above show). For example, Xinkan and various smaller Mesoamerican groups took on cultivation while retaining their integrity. So did the maize-agricultural Zuni, Keresan, Tanoan, Chitimacha, Natchez and Iroquoian populations. Since these acquired agriculture by acculturation, why is Hopi not just one more in the list?⁹

Hill's principal evidence is nine presumed UA cognate sets as evidence of PUA maize cultivation, though the association which these words have with maize is limited primarily to Hopi and SUA languages. These are problematic: borrowing has been proposed as an explanation for some; for others, wide semantic difference among the languages casts doubt on the cognacy; most require the assumption of considerable semantic shift, though a shift from earlier non-agricultural meaning to later maize associations is more plausible. This evidence is too limited to support Hill's claim.

It is disturbing that so few proposed 'cognates' exist and that the argument depends so heavily on Hopi. I mention briefly some difficulties.

Set 1. SH '*Artemisia argentia*', Hopi 'sand grass' /some SUA languages 'corn, cornfield'. Hill indicates that this does not reconstruct to PUA with a sense of maize. Also, borrowing is not ruled out for the SUA forms.

Set 2. Hopi 'corn cob' /SUA forms 'corn leaf, cane, corn stubble, straw storage bin, granary (corn crib)'. Many of the SUA forms meaning 'storage (granary)' may be internally diffused; otherwise, 'stubble, leaf, cane, cob' have associations more with dry plant parts than agriculture.

Set 3. Hopi 'hominy' /'seed, ear of corn', Guarijío 'seed but not of maize'. The PUA form is generally believed to have meant 'seed', not agricultural; Hill agrees that non-maize > maize is the most likely direction of semantic shift. The Hopi form *pa:cama* has some difficulties, a /c/ unexpected by regular sound correspondences and an unexplained /ma/.

Set 4. Tubatulabal 'to roast', other northern languages 'cook', 'to melt', 'to boil' /SUA forms 'to toast, parch', 'comal [griddle]', 'toasted corn', 'popcorn'. Probable direction: pre-agricultural 'toasting, roasting, parching' > SUA 'popcorn, parched corn'. (Some SUA forms are probably borrowed internally; compare also Zuni *sako* 'corn meal', SUA *saki*, etc. 'parched corn, popcorn'.)

Set 5. Hopi 'corn gruel', Hopi 'be sifting (using wind), winnowing', Tumpisha Shoshone 'winnow', Caluilla 'winnow, sift, blow something (like husks away from grain) /SUA forms 'harvest, shell corn, shell, shelled, shelled corn kernels'. Probable direction: 'sift' (pre-agricultural) > 'shell'. Only the first syllable /wi/ is compared, leaving the rest unexplained, not valid etymological procedure. This syllable could be onomatopoeic, from 'blowing'. The semantic fit among these forms is poor, probably not true cognates; the medial consonant does not fit regular sound correspondences.

Set 6. Hopi 'dried ear of corn', Hopi 'butt end of corn cob', other northern languages 'hooked stick to pull down piñon cones', 'pine cone harvesting hook' /SUA forms 'corn cob, corn cob with kernels removed'. The semantic associations among the northern languages are strained; the more likely direction of semantic change would be 'pinecone harvesting hook' > 'pinecone' > 'cob'. The Hopi forms are problematic; an unattested /ö:/ 'cob' is extracted from /qa:ʔö/ 'dried ear of corn' and /o:vi(-ʔat)/ 'butt end of corn

cob', though the leftover parts are of doubtful status. It is too short to defy chance, and it lacks the *n : l* sound correspondence (cf. /l/ of Nahuatl /o:lo:-tl/ 'corn cob'), the basis for putting the other forms into this set.

Set 7. Hopi 'griddle', other northern languages 'to roast, bake, roast under ashes' /SUA forms 'tortilla, tamale'. Some of the SUA forms have been identified as loans. Probable direction: 'roast' > 'tortilla, tamale' (and 'roast' > 'griddle').

Set 8. Hopi 'oblong cake of baked sweet corn, flour' /SUA forms: 'flat and thin object, such as tortilla griddle, flat, a flat place, griddle'. Probable direction: 'flat' > 'griddle'. (Hopi may be 'flat' > 'oblong cake'.)

Set 9. Southern Paiute *qumia* 'corn (rare)', 'Zea mays' is compared to Hopi *kokoma* 'dark red, almost purple', *koko* '*Amaranthus cruentus* (for dye)', and SUA forms *ku:mi-*, *gumí*, etc. 'to eat, chew on something that comes in little pieces; corn cob; bite something hard and small like popcorn; eat small things, eat corn, ear of corn; chew; chew with small bites; mouse'. Since the glosses are so different, the phonetic similarity may be accidental. I believe the Southern Paiute form is a borrowing.

Set 10. 'digging stick'. Hill (2001b) sets this set aside, since foragers too use them.

Set 11. 'to plant' requires neither maize nor agriculture, as in the sense of 'to fix/hide/bury something in the ground'.

The wide semantic latitude in several of these forms calls them into question. All Hill's cases appear better interpreted as semantic shifts from foraging to cultivation and not vice versa.

In short, Hill's reinterpretation of UA is not convincing. The northern homeland and foraging culture of PUA have more support. The spread of non-agricultural UA remains a problem for the farming/language dispersal hypothesis.

1.6. Conclusions on agricultural dispersals

The farming/language dispersal model may work for parts of Austronesian, Bantu and perhaps similar cases, but these are insufficient for generalizing about language spread and diversification. Agriculture is, at best, only one factor driving linguistic diversification, in many cases not the most relevant one.

2. Dixon's approach

Dixon's (1997) characterizes his 'punctuated equilibrium' approach as:

The hypothesis . . . is that there have been long periods of equilibrium during which a number of languages have coexisted — in a more or less harmonious way — within a given region without any major changes taking place. From time to time the state of equilibrium is punctuated by some cataclysmic event; this will engender sweeping changes in the linguistic situation and may trigger a multiple 'split and expansion' (which would be appropriately modelled by a family tree diagram) . . . After the events which caused the punctuation have run their course, a new state of equilibrium will come into being. (Dixon 1997, 67)

Dixon's book has become influential and therefore it is important to see whether it provides worthwhile insights. Where Dixon differs is in the degree of emphasis he places upon areal linguistics. He imagines that during a period of equilibrium,

languages in contact will diffuse features between each other, becoming more and more similar. These similarities will gradually *converge*, towards a *common prototype*. We can thus say that language families are rapidly made during a period of punctuation . . . and slowly blurred during the long period of equilibrium . . . that follows (Dixon 1997, 70–71).

This makes classification in terms of language families difficult or impossible. There are problems with this conception.

2.1. Punctuated equilibrium in biology

Dixon's 'punctuated equilibrium' was inspired by Eldredge & Gould's (1972) popular notion which is, however, challenged in biology. As Dennett (1995) argues, there is nothing special about punctuated equilibrium; evolution continues even without punctuated events disrupting equilibrium. Language change and differentiation into language families also continue in periods of equilibrium (in the absence of disruptive events), as Dixon (1997, 9–70) acknowledges. The unrealistic assumptions about human society have been criticized (cf. Nettle 1999, 99).

2.2. Equilibrium without diffusion

Dixon (1997, 70–71) believes that in periods of equilibrium 'languages in contact will diffuse features between each other, becoming more and more similar. These similarities will gradually converge'. But linguistic diffusion does not always take place in

situations of equilibrium. Languages in the same area over a long period of time may exhibit little evidence of contact-induced change. To cite just one of many examples, the Hano Tewa (Tanoan language) and Hopi (Uto-Aztecan) share the same very tiny mesa top harmoniously, yet extremely little borrowing or diffusion has taken place in either language (Kroskrity 1993). Diffusion is not a necessary outcome of equilibrium. This is a problem for the model's expectation that equilibrium gives diffusion.

2.3. Equilibrium with diversification

Contrary to expectations of the model, normal change leading to diversification into language families also takes place in equilibrium. There are many cases, with no evidence of punctuation, where the languages of a region continue to undergo normal change and to diversify into language families. Examples include: the Highland Mayan (K'ichean, Mamean subgroups), Zapotec (a complex of some 25 different languages recently diversified), Eskimoan, Nakh-Daghestanian, Lapp (Saami) languages (a subfamily of Finno-Ugric), various 'Papuan' families, etc. In short, a significant number of language families appear to have developed, in relative harmony, without punctuation, as Dixon (1997, 9–70) acknowledges.

2.4. Diffusion in punctuation

Linguistic diffusion can be caused by punctuation and does not take place just in equilibrium. Conquest and inequality are great promoters of structural diffusion among languages, and examples are common. For example, the history of English is mostly punctuated, with Scandinavian invasion and the Norman French conquest, but the outcome is that envisaged for equilibrium: English assimilated huge amounts of vocabulary, borrowed sounds and pronouns, and levelled morphosyntactic complexity. The impact of Spanish on the grammar of many indigenous languages of Latin America is a direct reflection of the inequality in the status of the languages involved and the punctuation that brought Spanish domination. Both forced-language contact (punctuation) and peaceful contact (equilibrium) can have similar outcomes.

Moreover, linguistic areas and areal phenomena shared across languages of a geographical region can arise as a response to punctuating factors (Hill 1978). Groups may join in areal associations in response to famine, resource failure, war and catastrophes of all sorts, structuring human organization at the areal level (see Hill 1978).

2.5. Caution about 'convergence'

Several scholars have interpreted Dixon's convergence with excessive enthusiasm. However, Dixon does not really see languages disappearing by convergence through long-term mutual influence in periods of equilibrium, just the opposite:

It is instructive to enquire what the possibilities are for two languages in contact over a very long period of time. Could they conceivably merge? I believe that the answer to this question is 'no' . . . All our observation of normal linguistic development suggests that a language never has more than one parent (Dixon 1997, 71).

We know from the well-studied linguistic areas that:

1. typically few diffused structural features are actually found in established linguistic areas, usually less than a dozen main ones (cf. Campbell 1998, 300–306);
2. cases of profound language mixture are basically not found; clear cases of language mixture are truly rare, and these do not arise through normal mechanisms of borrowing in language contact; rather, invariably they are the results of extreme social circumstances, e.g. forced population removals, generally not found in pre-colonial settings (cf. Bakker 2000; Thomason & Kaufman 1988);
3. reference to the family membership of the languages involved is necessary in order to determine diffusion — you can't tell whether it's borrowed or inherited if you don't know where it came from.

It is of some concern that several scholars have understood Dixon to mean that so much convergence is possible that the comparative method is no longer valid and whole languages and families disappear through convergence with one another. What they fail to realize is that in documented linguistic areas wholesale convergence is not known. True, diffused traits across language boundaries can make the task of distinguishing inherited from diffused material very difficult in some cases, but the convergence of initially independent languages to the extent of obliteration of language family connections is not on offer.

It must be concluded, therefore, that the correlation envisaged, which equates equilibrium with convergence, and punctuation with divergence, is not supported — both kinds of change take place in both kinds of situations. The notion provides no real purchase on the questions of why and how languages diversify and spread. They diversify and spread in both punctuation and equilibrium.

3. Nichols' program

Nichols' (1990; 1992; 1993; 1995; 1997; Nichols & Peterson 1996; 1998) program is very complex; here I concentrate only on her treatment of language zones, the part of her work most closely connected with language spread (for a general evaluation, see Campbell & Poser in prep.). Nichols' intention is to use 'non-genetic structural comparison to show that structural affinities between large language areas can be mapped . . . to give us an unimpeded, if rather spare and abstract, view of language origins and ancient linguistic prehistory' (1996, 267). She bases her work on a sample of languages which contains one language representative for each of some 200 'lineages' (called 'stocks' in Nichols 1992) from the some 300 existing 'lineages'. Her method, largely statistical with a very large geographical component, is inspired by population studies in biology and genetics. She tries to find ties among language populations and to gauge the relative age of linguistic traits in large-scale geographical areas, attempting to infer what the source and direction of spread of these structural features is, and also how the languages involved came to have their geographical distributions.

Spread zones and accretion zones are an important part of Nichols' analysis' (Nichols 1992, 231; 1997, 369):

An *accretion zone* (termed *residual zone* in previous works . . .) is an area where genetic and structural diversity of languages are high and increase over time through immigration. Examples are the Caucasus, the Himalayas, the Ethiopian highlands and the northern Rift Valley, California, the Pacific Northwest of North America, Amazonia, northern Australia, and of course New Guinea. Languages appear to move into these areas more often than they move out of them.

A *spread zone* is an area of low density where a single language or family occupies a large range ('clean sweeps': Bellwood 2001, 195), and where diversity does not build up with immigration but is reduced by language shift and language spreading. A conspicuous spread zone is the grasslands of central Eurasia . . . Another spread zone is central and southern Australia, in which the Pama-Nyungan quasi-stock has undergone several spreads to cover most of the continent . . . Another is northern Africa. Another is the Great Basin of the western United States. (Nichols 1997, 369)

The notions of accretion zones and spread zones are quite relevant to the question of how languages and

language families came to be distributed as they are. (The concepts figure in a number of papers in this volume.) There are, however, difficulties with these concepts.

3.1. Misassignment of 'zone' status

The accretion-spread zone distinction is central in Nichols' work, but it is misapplied in several instances. For example, she treats Mesoamerica as a 'spread zone', but by her criteria (Nichols 1992, 16–17) it is a residual (accretion) zone:

1. it has lots of linguistic diversity, not the low genetic diversity characteristic of spread zones;
2. it has lots of structural diversity, as opposed to the low structural diversity for spread zones;
3. the language families are not shallow, with Oto-Manguean calculated glottochronologically at 6400 BP, Uto-Aztecan at 5000 BP and Mayan at 4200 BP (see Kaufman 1974; 1976);
4. in opposition to rapid spread wiping out of existing families, Mesoamerican families stayed in place and rarely swallowed up other languages or took over anybody else's territory;
5. contrary to Nichols' criteria, there was no wide-spread *lingua franca* in Mesoamerica.

In short, Mesoamerica definitely conforms to Nichols' definition of an accretion/residual zone, not a spread zone. Mesoamerica is not the only 'zone' for which the label 'spread' or 'accretion (residual)' is questionable (see Campbell & Poser in prep.). This misassignment is serious. Nichols (1992) deals with only five spread zones (and five residual zones), so with even one of five misassigned (20 per cent), all the calculations involving these zones are seriously skewed, and all other calculations in which these zones play a role are distorted.

3.2. Problems of representatives

Some problems have to do with the geographic and linguistic composition of Nichols' (1992) zones. Of ten languages in the Mesoamerica zone, two (Chichimec, Miskito) fall outside Mesoamerica both geographically and linguistically. For example, both are SOV languages, while Mesoamerican languages typically lack SOV basic word order (Campbell *et al.* 1986). Chichimec is located beyond Mesoamerica to the north, Miskito outside to the south. Given that Nichols' Mesoamerica contains some non-Mesoamerican languages (20 per cent), all of her calculations concerning spread, stability, and the general character and distribution of linguistic traits in this area are skewed. Nichols' California area corresponds to the 'political boundaries' of the state. It includes

languages from the north (e.g. Yurok) to the south (e.g. Diegueño), but Yurok (Algic) and Diegueño (Yuman) share no significant features. Although there is a northern California linguistic area (with Yurok as a member) and a southern California–western Arizona linguistic area (where Diegueño is a member) (see Campbell 1997a, 335–8), these areas share no significant linguistic traits; there is no linguistic reason to place these languages together.

3.3. Spread zones and agriculture

There appears to be a tendency for scholars supporting the farming/language dispersal model to assume some association between agriculture and spread zones, since by the model, agriculture drives spreads. For example, Renfrew (2000, 29) opines that 'it may be concluded that when a linguistic spread zone is observed, it will in many cases be the result of a farming dispersal process'. He acknowledges, however, that 'a linguistic spread zone can also be created by an episode of élite dominance . . . such is the explanation usually offered for the distribution of the Indo-Iranian languages of the Indo-European family, and for the distributions of the Turkic and Mongolian languages also' (Renfrew 2000, 30). So, there is no necessary connection between a spread zone and agriculture.

Of the four spread zones originally identified in Nichols (1992), two involve no agriculture (interior North America, central and southern Australia), two do (Europe, Ancient Near East). Of those added later, the Great Basin lacks agriculture, and central Eurasia may have had it, but was focused on pastoralism and herding. central Eurasia is Nichols' best-defined spread zone, but she sees it as being produced not by farming dispersal, but by geographical determinism and political power (Nichols 1997; 1998). In short, a significant proportion of the few spread zones involves no agriculture; many agricultural dispersals are not found in spread zones, and even where there may be agriculture in a spread zone, the forces which shaped the zone in Nichols' view need have nothing to do with agricultural dispersal. So, caution about associating spread zones and agriculture is called for.

3.4. Do spread zones and accretion zones really exist?

Nichols (1992, 291) has four spread zones: ancient Near East, Europe, central Australia and interior North America (Mesoamerica, a residual zone, was eliminated from the list). These four are so different from one another that they raise doubts about the concept of the 'spread zone'. The ancient Near East is a recognized linguistic area (cf. Friedrich 1975;

Diakonoff 1990). It has considerable genetic diversity, with a number of unrelated language families and isolates. Central and southern Australia are entirely different in not being characterized by diffusion among genetically unrelated languages; rather, there is but a single widespread language family, Pama-Nyungan. As for Europe as a spread zone, it would appear that in her later work, Nichols (1997; 1998) considers it more the recipient of impact from the Eurasian zone than a proper zone of its own.

Interior North America appears to be arbitrary. It contains two members of the Northeast Linguistic Area (Seneca, Cree), four from the Plains Linguistic Area (Lakhota, Pawnee, Kiowa, Tonkawa), and one from the Plateau Linguistic Area (Kutenai) (cf. Campbell 1997a, 331–44). There is nothing in the linguistics, cultural anthropology or physical geography that would suggest that these languages ought to be grouped together. They have nothing in common (except the absence of coastline). Interior North America certainly does not match the spread zone definition of 'an area of low density where a single language or family occupies a large range, and where diversity does not build up with immigration but is reduced by language shift and language spreading' (Nichols 1997, 369). Eight different 'lineages' are represented in interior North America, twice as many as for two of her five residual zones (Ethiopia-Kenya and Caucasus: Nichols 1992, 290–91). In several of her cases, including interior North America, the common assumption that spread zones reflect large migrations that reduce former diversity is not what we see.

Perhaps it is time to abandon the notion of 'spread zone' and simply take recourse in the non-controversial concept of linguistic area, for those that fit. For those instances of putative spread zones involving few but widely spread languages, it appears that there is no particular set of linguistic or other factors which unite them; rather, they appear to be arbitrary pieces of geography or mere artefacts of local political and social history, better understood on a case by case basis as products of contingent history involving language spread.

It is difficult to see that the notions of spread zone and accretion zone do anything more than restate the facts of language distribution while misleadingly suggesting that there is some underlying organizing principle or explanation that does not really exist. For residual (accretion) zones, there must always be linguistic diversity, by definition, otherwise they would be mistaken easily for spread zones or just not be identified at all. Many residual zones nevertheless have some language families which

spread widely, behaving more like those thought to be confined to spread zones, while the other families in the zone do not. For example, in Mesoamerica (a residual zone by Nichols' criteria), Nahua (Uto-Aztecan) has spread far and wide, leaving Nahua-speaking communities from Nayarit to Panama. Similarly, Oto-Manguean stretches from above the Mesoamerican frontier to Nicaragua. However, the other language families of Mesoamerica mostly remain quite localized with very little outward spread. Similarly, while the Pueblo Linguistic Area fits Nichols' residual zone criteria, it also has incursions into it from the widespread Athabaskan family (Apachean: Navajo and Apache varieties: Bereznak 1995), and it could be argued that Hopi is intrusive, as well, while Kiowa (Kiowa-Tanoan) has moved out on to the Great Plains and spread out. While the Mayan languages seem to have stayed near to home, nevertheless Huastec is found separated by some 1000 kilometres to the north, though Huastec's closest sister, Chicomuceltec, is found among the other Mayan languages. Thus Huastec seems to suggest a spread while the bulk of Mayan languages fit residual zone traits.

At the same time, spread zones can have a number of residual pockets of surviving languages, giving a degree of linguistic diversity. If historical information were not available about movements and territorial take-overs, in some cases it would be difficult to determine whether a spread zone or residual zone were involved. In fact, given that the 'zones' Nichols (1992) works with are very large, covering continent-sized regions, it is not clear what independent criteria could be brought into the picture to show that the terrain involved is not included on a wholly arbitrary basis.

Nichols' residual zones are also not of a single consistent type. As Bellwood (2001, 195) points out, they can have 'two very distinct types of origin':

They can be 'end-of-the-line' regions of inflow and substratum residue, as in the concept of the friction zone . . . On the other hand, many regions of great diversity at the level of whole language families — areas such as the Middle East, Mesoamerica, East Asia in general and central Africa — cannot really be considered residual zones, but rather 'upwelling' or 'starburst' zones of net population increase and outflow. These regions are all agricultural homelands and all have linguistic profiles which reflect language family genesis and outflow rather than residual accretion.

Bellwood proposes 'three concepts: (1) the homeland starburst zone of language outflow and non-replace-

ment; (2) the spread zone of rapid language flow and widespread replacement; and (3) the friction zone of reticulation'. This responds to a problem in Nichols' definition, but requires clarification. Most of the problems with Nichols' spread zones remain for Bellwood's spread zones. The other two categories face the problem of how to distinguish them. Is the crucial difference really that 'starburst zones' are all 'agricultural homelands' and 'friction zones' are 'where hunter-gatherers lived in high densities'? If so, extremely few pristine friction zones will exist. If the crucial distinction is 'outflow and non-replacement' (starburst zones) and 'linguistic diversity without languages being lost in spreads' (friction zones), then, since both are characterized by linguistic diversity, how can one be distinguished from the other by purely linguistic means? Why would a starburst outflow and non-replacement of language not produce a friction zone's linguistic diversity without languages being lost in spreads? What would the linguistic difference be?

The terminological terrain dealing with the geographical distribution of linguistic diversity is becoming very complex. Renfrew's (2000) 'mosaic zone' appears to overlap Bellwood's 'starburst zone'; Bellwood's 'starburst zones' no doubt overlap Hill's (2001a) languages with 'localist stance' and Golla's (2000) 'compact language families' (below), though agriculture is not crucial to these other dichotomies. In the end, it is the questions of have linguistic traits diffused and have languages spread or not which matter. These are individual historical events which do not consult these various proposed kinds of zones to see whether or not they should proceed. The types of zone proposed by Bellwood and Renfrew seem to be more imposed on language diversity after the fact to try to save the farming/language dispersal model from cases that do not fit it rather than to explain the distribution of the languages.

In sum, Nichol's accretion-spread zone distinction is at best a misleading idealization. Moreover, Nichols' calculations concerning spread, stability, and the general character and distribution of linguistic traits for the zones with which she deals are called into question by the problems mentioned here. Her conclusions are not supported. In particular, the notion of spread zones and accretion/residual zones should be abandoned, and definitely should not be used in studies aimed at the questions addressed here.

4. Social factors

The farming/language dispersal model and Nichols' program both leave social factors mostly out of the

picture, while they are treated unrealistically in Dixon's approach. Nevertheless, many social factors are highly relevant to questions of language spread and diversification (see Hassan this volume).

4.1. *Language shift and maintenance*

The abundant literature on language shift ('replacement') and maintenance and on language endangerment shows that no approach to linguistic diversification and language spread which emphasizes only geography and economy will be adequate by itself. In general, language shift or maintenance boils down to people's social behaviour, speakers making choices, sometimes under duress and perhaps channelled by economic and other considerations, but also mediated by ideology and social factors. In the interest of space, suffice it here merely to list some of the factors contributing to language shift: discrimination and repression, exogamous marriage patterns, acculturation, military service, cultural disintegration, war and slavery, famine and epidemics, religious proselytizing, lack of social cohesion, lack of physical proximity among speakers, symbolism of the dominant language (e.g. political symbol of nation, cultural symbol of civilization), stigmatization and low prestige, absence of institutions that establish norms (political hierarchy, schools, academies, texts), rapid population collapse, communication with outside regions, resettlement and migration, literacy, compulsory education and official language policies. In addition there are economic factors such as resource depletion and forced changes in subsistence patterns, lack of economic opportunities, rapid economic transformations, shifting subsistence patterns, migrant labour, etc.

Social stratification, class and prestige must not be ignored. To mention just one example, Latin was not imposed in Gaul, but rather came to have a prestige role in various aspects of social life, in the military, administration, commerce and education, which led the local population to replace Gaulish over a period of several centuries (Bauer 1995) — no wave of advance brought Latin, rather the choice to acculturate did.

4.2. *'Esoterogeny', distributed vs localist stances and spread vs compact languages*

Recent work by Thurston (1987; 1989), Ross (1996; 1997), Hill (2001a) and Golla (2000) appears to converge as they address different kinds of language distributions, incorporating social and cultural factors and speakers' choices, which mediate them, investigating what this means for theories of language

diversification and language spread.

Thurston (1987; 1989) and Ross (1996; 1997) speak of 'esoterogeny' in New Guinea: 'a sociolinguistic development in which speakers of a language add linguistic innovations that increase the complexity of their language in order to highlight their distinctiveness from neighboring groups' (Foley 2000, 359); 'esoterogeny arises through a group's desire for exclusiveness' (Ross 1996, 184). In this way, the community language, which Ross (1996) calls the 'emblematic' language, emblematic of ethnic identity in a multilingual situation, becomes the 'in-group' code which serves to exclude outsiders (cf. Thurston 1989, 556-7; Ross 1997, 232). As Foley (2000, 359) observes, 'such a process would add significantly to linguistic diversity'.

In the case of Thurston's and Ross' 'esoteric' languages, it is attractive to imagine that these languages have undergone the various changes which differentiate them in order for their speakers to distinguish themselves from and exclude outsiders. It is not clear, however, how this hypothesized cultural motive for these changes could be tested or how the investigator might distinguish changes motivated for this purpose from changes which take place without such motives. That such cultural factors were necessarily involved would be difficult to prove since it is possible to cite many situations where other languages have undergone rather extensive changes, leaving them looking 'esoteric', but where no such motive seems to be behind the changes. Languages can undergo changes which consequently but not on purpose keep outsiders from understanding them without necessarily having the cultural teleology of intention to exclude outsiders.

Nevertheless, in spite of the questions I raise about the testability of the claim about cultural motives, recent work by Hill (2001b) and Golla (2000) goes in a direction similar to the Thurston-Ross line of thought, bringing in factors which potentially could make the thesis testable, or at least more tangible.

Golla addresses different kinds of language distributions, incorporating social and cultural factors. For Golla (2000, 60), *spread languages* are:

language communities all or most of whose constituent dialect communities are sufficiently distant from one another geographically and socially to make social contact sporadic and relatively unstructured. Such language communities are usually the result of the dispersal of speakers of related dialect communities across a wide territory, often by migration.

Examples include Inuit, Dene (northern Athabaskan

Slavey, Mountain, Bearlake, Dogrib, Hare), Sahaptin, Ojibway, etc. Spread languages often constitute chains of intelligibility.

Compact languages are:

language communities whose constituent dialect communities are closely adjacent and share a common interaction sphere (connected by trade, intermarriage, ritual and intergroup alliances and hostilities. (Golla 2000, 60)

Compact language communities were common along the West Coast, from Alaska to California, in the Pueblo southwest and along the Gulf Coast from Texas to Florida (Golla 2000, 60-61).

Examples include the nine divisions of Achomawi in northern California and the dialects of the Keresan pueblos of New Mexico. Golla cites Hill's (2001a) 'localist' strategy of closed groups whose 'insider/outsider' boundaries are marked by correspondingly abrupt linguistic discontinuity. Characteristic of compact language communities are phonological and grammatical differences among dialects that focus on a salient and easily dichotomized feature (Golla 2000, 60).

In similar fashion, Golla distinguishes two kinds of language families. *Spread families* are:

those that have largely developed in the geographical and social contexts that are conducive to the development of spread languages. Dialect communities develop into language communities with mutually unintelligible linguistic patterns owing to lack of contact and the independent 'drift' of their linguistic systems. Boundaries among these groups remain informal, and where contact exists multilingualism is common, even encouraged, and innovations are rapidly transmitted. This frequently results in the language-level equivalent of dialect chains, where adjacent languages share more features than more distant languages, although the time depth of their split may be the same. Such language chains are typical of Northern Athabaskan languages . . . and Sahaptin languages. (Golla 2000, 62)

Examples of spread families in North America include Eskimo-Aleut, Algic, Na-Dene (Tlingit-Eyak-Athabaskan), Salishan, Cochimi-Yuman, Uto-Aztecan, Siouan, Caddoan, Muskogean and Iroquoian.

Compact families are:

those that have largely developed in the geographical and social contexts that are conducive to the development of compact languages. Dialect communities develop into language communities in areas where the social boundaries are rigid and stable and where close contact with neighboring groups is the norm . . . patterns of interaction be-

tween adjacent dialect communities appear to have remained stable over many generations, with steadily increasing differentiation of linguistic systems. An important factor in this process is the social advantage of maintaining distinct adaptive systems focused on the exploitation of a relatively circumscribed territory. The continuance of such small-scale social units would appear to be dependent on encouraging monolingualism. (Golla 2000, 63)

Most examples of compact language families in North America are found along the Pacific Coast: Wakashan, Chimakuan, Tsimshianic, Chinookan, Coosan, Takelma-Kalapuyan, Wintuan, Maiduan, Miwok-Costanoan, Yokutsan, Shastan, Achumawi-Atsugewi, Pomoan, Salinan and Yukian (cf. Nettle 1999, 59).

The localist-distributed strategies and the spread-versus-compact languages and language families are not primarily about economics. Rather, they are about people's choices and how they restrict group membership and rights to participate in the cultural life of the group, about who gets to marry whom and where they will live — about the whole fabric of social life. These choices affect the diversification and spread of languages.

5. Conclusions

Agricultural dispersal is only one factor in the bigger picture of what drives language diversification and spread. There are many cases where the distribution of languages does not fit the farming/language dispersal model's predictions — there are many unexplained language spreads without agriculture and cases of linguistic diversity in spite of agricultural spread. The dichotomy between punctuation and equilibrium appears not to be relevant and, in any case, since both diffusion and diversification take place in both situations, in both states of equilibrium and of punctuation, it has no revealing role to play in addressing questions of language diversification and spread. The spread zone-accretion zone distinction is also neither useful nor reliable. The spread zones are so different from each another that nothing unites them and the concept should be abandoned.

On the other hand, the social behaviour of speakers is highly significant, as seen in factors contributing to language shift and maintenance, distributed versus localist strategies and spread versus compact languages and language families. These influence markedly the diversification and spread of languages and language families, and must be given a strong role in explaining these distributions.

Linguistic diversification and language spread appear to be the results of linguistic change mediated by social factors (speakers' choices) and contingent historical events (migration, conquest, climate change, choice to shift languages, etc.). Agriculture, geography, ecology and economics, to the extent that they play a role, are also mediated by social behaviour and particular historical events. It is doubtful that the non-linguistic, non-social generalizations discussed in this paper take us more than a short distance towards answering the questions raised here.

Notes

1. The diversification into families of related languages and the spread of language across territory are typically not distinguished in the works surveyed in this paper, though clearly they are not the same thing. They may be related, but they are not causally connected and can be independent of one another. In this paper, when the scholars discussed do not make this distinction, then neither do I, although clearly sometimes diversification is more at stake, other times it is spread.
Also, in work surveyed here, the distinction between a language and its speakers is often not made, so, for example, we see 'agricultural languages'. I assume the distinction, but find it convenient to continue to speak of languages having agriculture as shorthand for speakers of a particular language having agriculture.
2. For example, Bellwood (2001) asserts that 'whether the agriculture was being spread by converting hunter-gatherers or range-expanding farmers — both groups would have become subject to population increase in good environments'; LeBlanc (this volume) has it that 'all societies, except for a few in terrible environments, quickly approach the carrying capacity' (cf. Renfrew this volume). Contrary to such claims, however, a difference in population pressures is not visible in all instances, given numerous agricultural language communities which did not expand (see Hill 2001a). Zvelebil (this volume) argues persuasively against the assumption of rapid population growth in farming populations, pointing out that this 'would remove the central assumption underpinning the spread of farming into Europe by demic diffusion' (Zvelebil & Zvelebil 1988, 579).
3. Supporters of the farming/language dispersal hypothesis do not insist it must work in all cases to be accepted. As Peter Bellwood points out (pers. comm.), lots of farmers stayed at home, such as the Egyptians, and some hunters have adopted agriculture, such as the Agta, so, 'the hypothesis is meant to explain some deep-lying patterns, not all aspects of farmer distribution'. Nevertheless, so many exceptions on both sides of the equation do make it difficult to test the hypothesis.
4. Peter Bellwood (pers. comm.) appears to accept this

as a counter-example to the general trend of the farming/language dispersal hypothesis, but does not think Xinkans adopting agriculture is especially relevant for the whole hypothesis, which does not require that all farmers spread instantly and absorb everyone else. Thus the question becomes, how many examples of this sort which go against the predictions of the assumed general tendency expressed in the farming/language dispersal hypothesis would be necessary for doubts about the overall hypothesis to be raised? Since all the Mesoamerican groups, on the whole, fits the Xinkan pattern of agriculture by acculturation rather than by language spread, it would seem that these, together with other known cases, as seen in the charts in this paper, are sufficient to raise doubts.

5. For the majority of historical linguists, the assumption of disputed macrofamilies in works by Bellwood and Renfrew casts doubt on the farming/language model. How one views language diversity and spread around the world differs markedly if one counts only some 20 or less super-families (cf. Renfrew 1992) instead of the 300 or so independent language families that most recognize. If the disputed Amerind, Austric, Altaic, Indo-Pacific, Nostratic and the like have failed to convince linguists, then notions of agricultural dispersals built on such entities obviously will not be found very attractive. Since the model does not depend on these doubtful linguistic entities, they should be dropped.
6. Thanks to Linda Manzanilla (pers. comm.) for discussing cultivation at Teotihuacan with me.
7. For another difference, Bellwood (2000, 129–30) believes that American families have shorter time-depths than major Old World language families. With (glottochronological) dates from 5000 to 6000 BP, however, several of these are as old as established language families anywhere. After Afroasiatic (not entirely uncontroversial) no demonstrated Old World family is relatively older than the New World families Bellwood lists.
8. Renfrew and Bellwood do not say that hunter-gatherers never adopt farming, but do assert that it is extremely rare. The question is, again, as in note 4, how many counter-examples would be considered sufficient to constitute a serious problem for the hypothesis? I believe that the cases cited in this paper are abundant enough to call the hypothesis into question, though Peter Bellwood (pers. comm.) does not.
9. Also, 'spread zones are to be expected at high latitudes and in dry and/or seasonal continental interiors, conditions under which population density has generally been low' (Nichols 1998, 229), but Mesoamerica is not at a high latitude, not dry nor in a seasonal continental interior, and not low in populations density.

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