

# Cognitive Primitives of Collective Intentions: Linguistic Evidence of our Mental Ontology\*

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## 1. Introduction

In this paper, we address the nature of collective intentions on the basis of some recent results in linguistic theory. To frame the core problem, consider two people making hollandaise with one stirring and the other pouring. Their actions, stirring *versus* pouring, are simply enough described; however, the nature of their intentions is more complex. The pourer, for instance, does not merely intend to pour, but intends, additionally, that a hollandaise sauce will result. The stirrer too must have this second intention. However, since making a hollandaise requires both actions, it may seem that the stirrer intends the pourer's actions, and *vice versa*. What, then, are the individuals' intentions in such cases of collective action?

Tuomela and Miller (1988) propose a three-point account of collective intention that reduces 'we-intentions' to individual intentions together with a network of mutual beliefs. Bratman (1992, 1993), pursuing a similar intuition, argues that collective action requires 'appropriate attitudes of each individual participant and their interactions' (1993: 404). According to Searle (Searle 1990, see also Searle 1995), 'no such reduction will work' and he presents a counterexample to show that things that are not shared intentions nonetheless satisfy Tuomela and Miller's three criteria. Since then Gold and Sugden (2007) and Bardsley (2007) have shown more generally that, according to the three criteria, every Nash equilibrium counts as a *we-intention*. Bacharach (2006) makes the same point about Bratman's account. The key problem identified by these critiques of reductionist accounts is that coincidentally harmonized beliefs are misrepresented as *we-intentions*.

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Searle's reaction to such difficulties is to claim that "we-intentions" are primitive'. Other researchers share the intuition that an extra primitive is required, but disagree that *we*-intentions are it. Tuomela and Miller's three-point account (the target of Searle's criticism) is itself supplemented by a notion of 'joint social action', and work by Gilbert (1989) suggests the notion of 'plural subject'. Most concretely, Gold and Sugden (2007) argue that shared intentions arise via team reasoning, a position that suggests that the notion of grouphood is the required extra primitive (*cf.* also Bacharach 2006).

In this paper, we use data and findings from theoretical linguistics that show that *we* is not a cognitive primitive, but is itself composed of notions of *I* and grouphood. We use the ramifications of this finding, specifically, its effects on the structure both of grammatical and lexical systems, to argue that what must be added to our understanding of shared intentionality is not a primitive *we*-intention, but the notion of grouphood implicit in team reasoning, coupled with the individual concept *I*.<sup>1</sup>

Finally, before proceeding, a brief methodological note. We assume that the study of cognition should, insofar as possible, be conducted as a unified whole, with the results of one area being assumed relevant for the study of others. This may sound obvious, given the preceding paragraph, or even platitudinous, given general principles of parsimony. However, we highlight it here for two reasons: because some readers might wonder why, in principle, linguistics is relevant to researchers whose concern lies with the theory of collective intention, and because, more specifically, we will call on arguments from parsimony below.

## 2. A problem of primitives

Let us begin by stating the problem and proposed solutions in greater detail.

When two people make hollandaise sauce, with one stirring and one pouring, they are said to have a collective intention: that is, in addition to the pourer's intention to pour and the stirrer's intention to stir, both stirrer and pourer must have the intention to produce hollandaise sauce as the joint result of their individual actions. The collective intention is, therefore, more than the mere sum of their individual intentions, *i.e.*, more than the stirrer's intention to stir plus the pourer's intention to pour. These two individual actions can only have the effect of producing a hollandaise if properly coordinated, and not if, for instance, the pourer is by the sink and the stirrer by the hob. Alternatively, two sauciers in neighboring restaurants might well make batches of hollandaise at the same time, but the sense in which *We are making hollandaise sauce* holds true for them is quite different from in the stirring-pouring scenario, as each is engaged in a separate activity, the outcome of which does not depend on the other's action: if one saucier fails, the other can still succeed, but if one of the stirrer-pourer pair fails, then so must the other. In sum, coincidentally harmonized actions are not joint actions and coincidentally harmonized intentions are not collective intentions.

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<sup>1</sup>It is beyond the scope of the paper to consider what the criteria of grouphood are. Needless to say, this is a debate in which philosophers, linguists, and other researchers, including sociologists, sociolinguists, and cognitive scientists, all have stakes.

Analyses of collective intentions attempt to articulate what differentiates the intentions associated with joint actions from other intentions. A dominant strand of research (*e.g.*, Tuomela and Miller 1988; Bratman 1992, 1993) attempts to reduce collective intentions to individual intentions and beliefs and the relations between them. Tuomela and Miller, for instance, offer a three-part reduction, the essential features of which can be illustrated with respect to a two-member group,  $\{P_1, P_2\}$ . Consider some ‘joint social action’,  $A$ , which comprises the subactions  $A_1$  and  $A_2$  for the respective individuals. According to Tuomela and Miller,  $P_1$  has a *we*-intention with respect to  $A$  if:

- (i)  $P_1$  intends to do  $A_1$ ,
- (ii)  $P_1$  believes that  $P_2$  will do  $A_2$ ,
- (iii)  $P_1$  believes that  $P_2$  believes that  $P_1$  will do  $A_1$ , and so on (p. 375)

Observe that (i) is an intention of  $P_1$ , (ii), a belief of  $P_1$ , and (iii), a belief of  $P_1$  about another’s belief. As the same beliefs are held, *mutatis mutandis*, by  $P_2$ , the account reduces *we*-intentions to individual intentions and a network of mutual beliefs.

A problem for such reductive accounts, first pointed out by Searle (1990), is that (i)–(iii) may be satisfied in cases where the  $A_i$  do not plausibly have any shared intentions. That is, such accounts ‘overgenerate’. Searle’s own example, concerning a business school, might reasonably be felt to be at the margins of likelihood,<sup>2</sup> thus leading sceptics to wonder whether counterexamples to reductive accounts only arise in similarly marginal cases. However, Gold and Sugden (2007) show that the problem is quite general and that it arises in the case of game-theoretic Nash equilibrium. The overgeneration problem arises because (i)–(iii), or their analogues in other accounts, characterize every Nash equilibrium as a case of collective intentionality. In a Nash equilibrium, each individual’s action is a best response to their true beliefs about the others’ actions. Since these are intentional actions, this is equivalent to saying that each individual’s intention is adapted to their true beliefs about the actions of the other. Thus the criteria for being a *we*-intention are satisfied. But, in many cases, the Nash equilibrium does not involve a collective intention. Reductionist accounts mischaracterize such cases.

A clear example is provided by the Stag Hunt game. The two hunters can hunt either stag or rabbit. Rabbit provides a small amount of meat, but can be caught by one person. Stag provides more, but requires two people to catch one. Thus, if one player hunts stag and the other, rabbit, the stag-hunter will go hungry. We can imagine the following payoffs:

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<sup>2</sup>Searle (1990: 404–405) shows that Tuomela and Miller’s (i)–(iii) are satisfied in the following scenario: ‘Suppose a group of businessmen are all educated at a business school where they learn Adam Smith’s theory of the hidden hand. Each comes to believe that he can best help humanity by pursuing his own selfish interest, and they each form a separate intention to this effect; that is, each has an intention he would express as “I intend to do my part toward helping humanity by pursuing my own selfish interest and not cooperating with anybody.” Let us also suppose that the members of the group have a mutual belief to the effect that each intends to help humanity by pursuing his own selfish interests and that these intentions will probably be carried out with success. That is, we may suppose that each is so well indoctrinated by the business school that each believes that his selfish efforts will be successful in helping humanity.’

Strategy		Outcome
P <sub>1</sub>	P <sub>2</sub>	P <sub>1</sub> , P <sub>2</sub>
stag	stag	10, 10
stag	rabbit	0, 7
rabbit	stag	7, 0
rabbit	rabbit	7, 7

Figure 1: Stag Hunt

There are two Nash equilibria in this game: *(stag, stag)* and *(rabbit, rabbit)*. The equilibrium *(rabbit, rabbit)* has the property of ‘risk dominance’ (Harsanyi and Selten 1988): it is the safer strategy because, regardless of the other player’s action, the rabbit-hunter will never go hungry. Note, however, that, although we would want to say *(stag, stag)* involves a *we*-intention, we would not want to say that of two agents, each hunting rabbit. A correct analysis of *we*-intentions must distinguish between the two equilibria.

Consider, however, the intentions involved in P<sub>1</sub>’s action in the risk-dominant Nash equilibrium. We suppose, as above, that both players are rational and know each other to be rational. In consequence, both know that rabbit-hunting is the risk-dominant strategy. As a result:

- (i) P<sub>1</sub> has the intention to rabbit-hunt
- (ii) P<sub>1</sub> believes that P<sub>2</sub> will rabbit-hunt
- (iii) P<sub>1</sub> believes that P<sub>2</sub> believes that P<sub>1</sub> will rabbit-hunt

Thus, according to Tuomela and Miller’s analysis of collective intentions, the risk-dominant Nash equilibrium constitutes a joint intention. However, this is wrong: the game is so constructed that the players must arrive at their strategies independently. Moreover, by both hunting rabbit, a non-cooperative activity, each receives a yield of 7 (bottom row of figure), whereas, if they had truly formulated a collective intention, it would have been to hunt stag, for a higher yield (top row).

Bacharach (2006) argues that Bratman’s (1992, 1993) reductionist account of ‘shared intention’, which Searle does not discuss, is also problematic in this respect. For Bratman, the key feature of a shared intention to J is that, for each agent, I intend that we J ‘in part because of your intention that we J’ (1992: 104 with italics; 1993: 104 without italics). At first glance, one might think that your intention being part of my motivation might avoid the mischaracterization of Nash equilibria as collective, or shared, intentions. However, when two rational players execute their Nash equilibrium strategies, each believes that the equilibrium outcome will come about, in part, because of the intentional action of the other, in playing their part of the strategy combination. If ‘intending that J in part through P<sub>1</sub>’s intention’ implies believing that ‘P<sub>1</sub> has and acts on the intention’, then Bratman’s condition is, in fact, satisfied in every Nash equilibrium. In the example above, P<sub>1</sub> intends that they each hunt rabbit, and believes that P<sub>2</sub> intends to hunt rabbit, and P<sub>1</sub> acts on that intention in part because of P<sub>2</sub>’s intention.

Bratman might object that his ‘planning conception of intention’ (1992: 330–331), which conceives of intentions as action-guiding mental states maintained over a period

of time, excludes such one-off games the Stag Hunt. His shared intentions allow individuals to coordinate their actions over time, by guiding the formation of their ‘subplans’. This alone is not enough to remove his analysis from the ambit of the overgeneration argument. As Gold and Sugden (2007) show, one can still give this account of shared intention a game-theoretic interpretation by considering it as an extended game comprising a sequence of ‘stage games’, with the individual stage-game strategies constituting the subplans. More generally, as Bacharach notes, ‘any situation in which people have to make the sorts of decisions that issue in shared intentions must be a game, which is, after all, just a situation in which combinations of actions matter to the combining parties’ (2006: 139).<sup>3</sup>

Searle’s response to the problem of over overgeneration is to claim that no such reduction as Tuomela and Miller’s will work (*cf.* Bacharach’s 2006 critique of Bratman’s 1992, 1993 analysis). Instead, he regards collective intentions as ‘primitive’. Indeed, in later work, he writes that ‘Collective intentionality is a *biologically primitive* phenomenon that cannot be reduced to or eliminated in favor of something else’ (Searle 1995: 24, *our emphasis*). However, Bacharach suggests that the distinctiveness of collective intentions consists in being the result of a particular method of reasoning. Gold and Sugden (2007) expand on this point, arguing that collective intentions are those that result from ‘team reasoning’, where the individual first determines what the group as a whole should achieve (*What should we do?*) and then works out their part in the best team plan (*What should I do?*). On this view, in addition to team reasoning, reference to the *group* and to *I* are ineliminable parts of the process of forming a joint intention.<sup>4</sup>

Now, there is a weak sense in which the Bacharach-Gold-Sugden view is consonant with Searle’s (beyond their rejection of joint intentions as networks of mutually shared individual intentions and beliefs). If we take Searle’s ‘primitive’ to mean ‘explanatorily prior’, then this there is no disagreement: before the individual intention, to stir or pour, or to hunt stag or rabbit, comes the collective intention, to make hollandaise, or manage the resource for optimal mutual benefit. Some of Searle’s exposition might be seen as supporting the idea that he means ‘explanatorily prior’:

Collective intention ... presupposes a sense of others as more than mere conscious agents, indeed as actual or potential members of a cooperative activity.  
(Searle 1990: 414)

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<sup>3</sup>Another response is available to Bratman, which could exempt his analysis from the ambit of game-theoretic counterexamples; namely, that his theory concerns group agency, rather than collective intentions. Indeed, Bratman says that his target is not the *we*-intention of Tuomela and Miller, nor the collective intention of Searle, which are the intentions of individuals concerning the group’s activity. Rather, his shared intention is the intention of a group; it is a state of affairs that plays a functional role analogous to the intentions of an individual, which ‘organize and unify’ that individual’s agency over time (1993: 99). Such intentions express a disposition to reason and act as a member of a group (that is, group agency) and are prior to the members’ deciding how they will coordinate their actions so as to achieve their goal (which is where the possibility of collective intentionality arises). See Gold and Sugden (2007) for further analysis.

<sup>4</sup>Bacharach, couching his account in terms of rational choice theory, argues that the group utility function and the individual utility function are primitive. Modulo talk of utility functions, this amounts, we believe, to much the same thing.

The crucial element in collective intentionality is a sense of doing (wanting, believing, etc.) something together, and the individual intentionality that each person has derived *from* the collective intentionality that they share.

(Searle 1995: 24–25, his emphasis)

However, his use of terms ‘unanalysable’ and, more strikingly, ‘biologically primitive’ strongly suggests that he intends a different sense of primitive, one at odds with the view that collective intentions arise via a reasoning process that presupposes *group* and *I* as primitives. On the Bachrach-Gold-Sugden view, collective intentions are not primitive parts of our mental ontology, that is, the collection of concepts by which individuals’ behavior is planned, rationalized, and explained.

It is very challenging, purely within the context of the theory of collective action, to find evidence that decides between Searle’s non-reductionist and the Bachrach-Gold-Sugden neo-reductionist positions. Certainly, both cope equally well with the problem of Nash equilibria: given that  $P_i$  does not presuppose  $P_j$ ’s cooperation, there is no collective intention on the non-reductionist account; and given that there is no reasoning by  $P_i$  about what  $P_i$  and  $P_j$  should jointly do, there is no team reasoning and hence no collective intention on the neo-reductionist account. So, if evidence is to be found that discriminates between the accounts, it will likely have to come from beyond the domain of the current debate.

One obvious quarter from which such evidence might come is experimental psychology, which might be able to prove, or disprove, that we use ‘team reasoning’ as a mental process (see, for instance, Colman, Pulford, and Rose 2008). However, an alternative to seeking support for the mental process proposed by Gold and Sugden (2007) is to seek support for their primitives, *group* and *I*. This is the task we will set ourselves in this paper, and the evidence we will draw on comes from the domain of theoretical linguistics.<sup>5</sup>

### 3. Primitive egos

Our basic assumption, following Davidson (1967, 1973), Montague (1970), and much subsequent work, is that natural language is compositional and that the atoms of such composition cast light on the concepts that form part of our mental ontology (where ‘mental ontology’ and ‘knowledge of language’ are understood as internalistically). To support the Bachrach-Gold-Sugden view, therefore, we would want to see that *group* and *I* are basic concepts that receive special expression. To support the Searlean view, we would want to see that *we*-intentions receive special expression, to distinguish the different senses of *We intend to make hollandaise* (the neighboring chefs *versus* stirrer-pourer scenarios).

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<sup>5</sup>It is possible that the two accounts engender quite different research agendas with respect to non-human collective action, particularly where such behavior involves (in contrast to simple pack action) distinct, learned skills contributed by different expert participants, as has been documented in, for instance, hunting by dolphins and killer whales. Collective action as a biological primitive suggests a search for biological homologies across humans, cetaceans, and possibly other animals. Collective action as a form of reasoning, by contrast, suggests a search for the relevant cognitive subcapacities. Whether these research agendas would remain distinct in practice, however, is far from obvious.

Our main claim will be that there is substantial evidence for the former primitives (sections 3.1–3.2) and none for the latter. If anything, there is evidence against the latter position (section 4). The data we adduce in support of the primitives *group* and *I* centers on the form of the word ‘we’ in diverse languages (section 3.1) and its behavior in different grammatical constructions (section 3.2). Our purpose is to present the data in such a way as to lead to a natural understanding of the primitives that are available to grammatical cognitive systems.

Implicit in our reasoning is the assumption that such primitives of grammar are available also to other cognitive systems, such as those implicated in intention sharing and action planning. However, there is, of course, the possibility of mismatch between the primitives available to grammatical and non-grammatical systems. Now, to appeal the possibility of such mismatch in defence of the non-reductionist position is, we argue, in opposition to basic principles of parsimony. Moreover, there are good empirical grounds to believe that the linguistic primitives are exhaustive (section 4) and so to conclude that primitive *we*-intentions are not part of mental ontology.

### 3.1. Basic arguments

Let us begin with languages in which the word for *we* is obviously not simplex (*i.e.*, is morphologically complex). If we look at how such languages construct their *we*-words, we find (a) that *we* is constructed from *I*, and (b) what is added to *I* in such cases is either a straightforward plural or else, frequently, an element meaning *group* or something similar. Thus, *I* and *group* are the primitives from which *we* is derived.

The pattern of adding a plural to *I* is well attested.<sup>6</sup> We present three examples from two different geographical areas (three distinct language families). In Mandarin Chinese, the word for ‘I’ is *wǒ*, which is contained in the plural counterpart for ‘we’, *wǒmen*. The same suffix is found in other plurals, such as *lǎoshī(men)* ‘teacher(s)’ and *xuésheng(men)* ‘student(s)’ (Chappell 1996). In Vietnamese, formal and informal words for ‘I’, respectively, *tôi* and *mình*, are again subparts of the formal and informal words for ‘we’, *chúng tôi* and *chúng mình*. As in Mandarin, the added element, *chúng*, is found in other singular-plural pairs, such as *nó* ‘(s)he/it (non-adult)’, *chúng nó* ‘they (non-adults)’ (Ngô 1999). Finally, in Miskitu (a Misumalpan language of Nicaragua), the difference between ‘I fell’, *yang kauhiri*, and ‘we fell’ *yang nani kauhiri*, is the element *nani*. The same element is used to derive the plural from the singular, as in *aras (nani)* ‘horse(s)’ (Green 1992).

Not all languages with constructed *we*-words add the plural to *I* to create *we*. Instead, some add a noun, or similar element, with a meaning like *group*. Again, we give two examples from distinct language families and geographical areas. In Thai, *pûag rao* ‘we’ explicitly contains the word for ‘group, party, community’. (The same word may be added to *káo* ‘(s)he’ to create *pûag káo* ‘they’; Becker 2006.) In Japanese, the element added to the words for ‘I’, for instance, *boku* or *watashi*, to produce ‘we’ is *tatji*:

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<sup>6</sup>By ‘well attested’, we mean that it is a significant minority pattern. We do not attempt to quantify this though (in terms of percentages or other means) however, as to do so involves counting tokens and thus fails to control for areal and genetic factors.

*bokutatji*, *watashitatji* ‘we’. More literally, the meaning of these terms is ‘Me and my associates/group’. The same element may attach to proper names, like *John*, to produce *Johntatji* ‘John and his associates/group’ (Nakanishi and Tomioka 2004). Thus, *we* is constructed, in some languages, from *I* plus some group-like element.

The evidence just presented creates a strong case for the idea that *we* is constructed out of two more basic notions, namely, *I* and the concept of plurality or grouphood. Precisely the Gold-Sugden primitives. However, such constructed *we*’s are noteworthy for a second reason relating to the purported primitivity of *we*-intentions. The languages above add to the singular to create the plural (as English does for common nouns, like *pig(s)*). In other languages, by contrast, one finds nouns for which the plural is the primitive from which the singular is constructed, such *moch* ‘pigs’ / *mochyn* ‘a pig’ in Welsh (Jones 1991), *áá* ‘trees’ / *áádau* ‘a tree’ in Kiowa (a Kiowa-Tanoan language of Oklahoma; Harbour 2007), and *sínkir* ‘fish’ / *sínkirrí* ‘a fish’ in the Maasai dialect of Maa (a Nilotic language of Kenya; Corbett 2000).<sup>7</sup> Given the possibility of constructing singulars out of plurals, we must recognize, as a logical possibility, that some languages might construct *I* out of *we* and a ‘singularizer’ like Welsh *-yn*, Kiowa *dau*, or Maasai *-rí*.

In light of such languages, there is an interesting disparity to be noted between the non-reductionist and neo-reductionist positions. If we take the primitives of the neo-reductionist account and treat them as linguistic primitives, we are immediately able to characterize some well attested linguistic patterns. Now, if we attempt the same transition with the non-reductionist account, we arrive at the view that *we* is basic and *I* is constructed from it. It is striking that, in the extensive literature on pronominal systems (e.g., Corbett 2000, 2006, Cysouw 2003, Siewierska 2004), and despite the existence of plural-to-singular derivations, no language has been found that derives singular *I* from plural/group *we*.

Now, the claim that *we*-intentions are primitive does not commit one to the claim that the pronoun *we* is primitive and that *I* derives from it. (One might, for instance, claim that *we* and *I* are both primitive, or that *we*-intentions are primitive and that pronouns are quite orthogonal; positions we argue against in sections 3.2 and 4 respectively.) There is, nonetheless, a notable disparity in terms of how comfortably the two accounts of collective intentions sit with some fairly basic linguistic evidence. More importantly, basic principles of parsimony strongly support any account, the primitives of which can be directly imported in another domain. Given that the neo- and non-reductionist positions are equally well matched with respect to their core data, it is precisely with respect to such non-core data that they can most sensibly be evaluated. To defend the non-reductionist account by ignoring such data is contrary to standard scientific practice. (See section 4 for empirical arguments against the non-reductionist position.)

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<sup>7</sup>We omit gender prefixes from the Maasai Maa examples, for reasons of simplicity.

### 3.2. Non-basic arguments

Anyone reading this article will, of course, be aware that not all languages base their words for *we* on *I*. English, for instance, does not. One might, therefore, think that the one type of evidence is being preferentially treated: if the existence of constructed pronouns counts in favor of *we* not being cognitively primitive, then the existence of non-constructed pronouns should count in favor of *we* being primitive after all. As suggested in the previous paragraph, this position might be taken as natural pronominal corollary of the claim that *we*-intentions are primitive.

In fact, it is easy to explain this disparity. The phenomenon whereby a complex form (such as *we*) is not merely the pronunciation of its primitive parts (*I* plus plurality/grouphood), is known as *suppletion*. Besides *we*, it affects plural formation in common nouns, such as *goose/geese* in English, *'išah* 'woman' / *našim* 'women' in Hebrew, and *bič'ni* 'sack corner' / *boždo* 'sack corners' in Archi (a Lezgian-Samur language of Dagestan). Furthermore, suppletion occurs in many grammatical domains beyond plurality. For instance, in English, the past tense of *go* is suppletive, *went* (not *goed*), as are the comparative and superlative of *good/better/best* (not *good/gooder/goodest*). The phenomenon of suppletion simply concerns an irregular relation between meaning and pronunciation: the plural of some nouns is not pronounced as noun+plural, but as an irregular, one-off form (similarly for the past tense of some verbs, the comparative of some adjectives, and so on). This does not cause one to revise one's view of what primitives are, but merely to recognize that meaning and pronunciation are not always perfectly correlated. Thus, the pronunciation of *I* and *we* is unrevealing of the primitives out of which they are built.

Interestingly, however, even in languages where *we* is not constructed from *I* plus plural/group, one can still find evidence for *I* being the more primitive. We present two grammatical phenomena that show this. To do this, some simple concepts from linguistic theory are required. (Readers less concerned with linguistic detail should nonetheless briefly familiarize themselves with the basic theory immediately below, as it is relied on in section 4.)

#### 3.2.1. Some basic theory

The arguments presented below rely on two key concepts of theoretical linguistics: *features* and *underspecification*.

Features are the atomic units out of which pronouns (and other elements) are built. They are understood to be predicates, P, that may either be asserted [+P] or denied [-P]. Below, we require reference to two features: [ $\pm$ speaker] and [ $\pm$ singular]. These mean, respectively, 'does (not) contain the speaker' and 'is (not) singular'. Thus, in terms of these features, *I* is [+speaker +singular] and *we* is [+speaker -singular].

Underspecification is a means of economizing on information. For instance, the feature matrices for *I* and *we* are oppositely specified only for one feature, [ $\pm$ singular]. So, they can be simplified in one of two ways:

- (a)  $I = [+speaker]$                        $we = [+speaker -singular]$   
 (b)  $I = [+speaker +singular]$      $we = [+speaker]$

The idea behind underspecified feature matrices is that the unspecified features are understood by default. In (a), for instance,  $I$  is understood as being [+singular], even though there is no overt feature signalling this.

The data from Mandarin and like languages shows that the underspecification in (b) cannot be correct, for a very simple reason. The pronunciation of  $we$  in all the cases is larger than that of  $I$ . As what is pronounced is the features,  $we$  must contain more features than  $I$ . (If (b) were correct, we would expect  $I$  to be  $we$  plus something extra, which, as already observed, does not arise for these pronouns.)

Conversely, (a) derives precisely the relations we observe. If  $w\check{o}$  meant [+speaker +singular], one of two problems would arise. Either,  $w\check{o}$  could not be used to pronounce ‘we’ [+speaker –singular], as  $w\check{o}$  contains [+singular] but ‘we’ does not. Or else  $w\check{o}men$  would be contradictory, on the assumption that  $men$  means [–singular], for then  $w\check{o}men$  would mean [+speaker +singular –singular] = ‘contains the speaker and is singular and is not singular’. If we assume, as in (a), that  $w\check{o}$  means just [+speaker], and if  $men$  means [–singular], then the pronunciation of ‘we’ [+speaker –singular] is  $w\check{o}$ , the pronunciation of [+speaker], together with  $men$ , the pronunciation of [–singular].

With this theory in place, we now turn to two different phenomena. In both cases, our presentation will be the same and will proceed in three stages. (1) We introduce the phenomenon. (2) We develop it as a diagnostic for underspecification, using first *versus* third person. Above, we considered only underspecification of number (singular *versus* plural). Applied to person, the notion of underspecification is, simply, this: If the pronouns  $I/we/(s)he/it/they$  are specified for [ $\pm$ speaker], then first person ( $I/we$ ) must be [+speaker] and third person ( $(s)he/it/they$ ) must be [–speaker]. However, we can treat third person as the default interpretation that arises in the absence of specification. It may, in consequence, be underspecified for [ $\pm$ speaker] (*cf.* Benveniste 1966). To show that the phenomenon is diagnostic of underspecification means that it distinguishes between fully specified and underspecified pronouns.<sup>8</sup> (3) We apply the diagnostic to singular *versus* plural, to show that singular is underspecified, plural not. This demonstrates that  $I$  has a more basic representation than  $we$  and that  $we$  is constructed from  $I$  and other elements.

### 3.2.2. *The person case constraint*

(1) The first phenomenon we are concerned with is a well studied and extremely well attested one. We illustrate it first with respect to English. English has two nearly synonymous constructions for ‘ditransitive’ verbs like *show*, *give*, *present*, *introduce*, and so on:

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<sup>8</sup>A background assumption in this discussion is that languages may differ in point of which features they underspecify. In section 3.2.2, we see that number may be underspecified in Romanian, where it interacts with the person case constraint, though not in French, where it does not. In section 3.2.3, we see that number may be underspecified in Dhirari, and like languages, where it interacts with ergative marking, though not in Georgian, where it does not.

the ‘prepositional dative’, *She showed them to him*, and the ‘double object construction’, *She showed him them*. Interestingly, when the direct object (the thing shown) is first or second person, only the prepositional dative is possible: for instance *She showed me to them*, but not *She showed them me*. The person case constraint is the restriction that, when a ditransitive verb takes two pronominal objects, the direct object (in this case, *me*, the thing shown) must be third person.

For certain technical reasons, the effect is somewhat subtle in English: the unacceptable sentences are, for some speakers, only mildly degraded. In most languages where it is attested, however, the aberrant sentences are far more robustly bad. One such language is French. In sentences such as ‘She showed them the book’ and ‘She showed me to the professor’, ‘them’ and ‘me’ may be represented by the object pronouns *leur* and *me*. One therefore expects ‘She showed them me’ (*i.e.*, me to them) to use both *leur* and *me*. However, *Elle me leur a montré* is in fact ungrammatical, and, as in English, a preposition (*à*, and a different form of ‘them’, *eux*) must be used: *Elle m’a montré à eux*. Although both the languages just discussed are Indo-European, the person case constraint is found across the world (see, *e.g.*, Haspelmath 2002).

(2) The person case constraint connects to underspecification on a wide variety of analyses (*e.g.*, Anagnostopoulou 2003, Béjar and Řezáč 2004, Adger and Harbour 2007). These essentially argue that the double object construction is able to cope only with a certain quantity of features and, if it is overburdened by the direct object, ungrammaticality results. That is, pronouns that are ‘too big’, in sense of having too many features, are ungrammatical as the direct object. We explained above the standard view that the first person must be specified [+speaker], but that third person may be underspecified. It follows, therefore, that the person case constraint is a diagnostic of underspecification: fully specified pronouns are unacceptable as direct objects (hence, the difference between the acceptable *She showed them him* and the degraded *She showed them me*).

(3) Now, there is a core set of properties to the person case constraint that is invariant crosslinguistically (for instance, the unacceptability of *me leur*, *them me*). However, in some more subtle cases, languages do vary as to which combinations of pronouns are ungrammatical. One strand of this variation concerns number. It has been observed that, if speakers find a difference in acceptability between singular and plural pronouns, then it is the singular that is acceptable. So, for instance, Nevins and Săvescu (2008) show that, for some Romanian speakers, ‘giving you us’ is unacceptable, but ‘giving you me’ is not. In (2), we said that fully specified pronouns are unacceptable in such configurations. We can straightforwardly account for the difference between plural and singular in Romanian, given that ‘me’ [+speaker] is underspecified for number, but that ‘us’ [+speaker –singular] is not.

Now, recall that we are concerned in this section with languages where *we* is not constructed out of *I* together with some plural or group-like element. Romanian *ne* ‘us’ is clearly not the pluralization of singular *mă* ‘me’. Thus, we have evidence that, even when plural *we* is not overtly constructed out of *I* and a plural or group-like element, it is still

non-primitive: it is the pronunciation of [+speaker –singular], which is, self-evidently, a combination of the primitives [+speaker] and [–singular].

### 3.2.3. Ergativity

(1) Subjects of transitive verbs in many languages receive special marking, a case known as the ‘ergative’. The case is found, for instance, in Georgian (a Kartvelian, non-Slavic/non-Indo-European, language of the eponymous country). Compare *Gogo midia* ‘The girl came in’ and *Me gogo vnaxe* ‘I saw the girl’ with *Gogom prtskvena msxali* ‘The girl peeled the pear’. Only in the last one is ‘girl’ the subject of a transitive verb; in the first, the verb is intransitive, and in the second, the verb is transitive, but ‘girl’ is the object. In the first and second sentences, ‘girl’ appears in its basic form, *gogo*. However, when the subject of a transitive verb, it appears in the ergative, as *gogom*.

The phenomenon of ergative marking is, in many languages, person-dependent, that is, some persons receive it, others do not. In Georgian, for instance, first persons (*me* ‘I’, *čven* ‘we’) never receive ergative marking, but third persons (*gogom* ‘girl ERG’, *gogoebma* ‘girls ERG’) do.<sup>9</sup>

(2) Person-dependent ergative marking although well documented has not received as much analytic attention as the person case constraint. However, one account (Harbour 2006a) ties it to underspecification. The idea is that subjects of transitive verbs must be fully specified for person. Now, consider a language in which third person is underspecified for [±speaker]. When a third person is the subject of a transitive verb, it will receive an extra feature, [–speaker]. Nothing will be added to first persons on the other hand, as they are already specified as [+speaker]. The pronunciation of such added features yields what is traditionally labeled as the ergative. Hence, ergative marking occurs on the third person, never on first, in such languages. It follows, therefore, that, when ergative marking occurs only on some (pro)nouns, it is diagnostic of which are underspecified.

(3) Again, as for the person case constraint, the present phenomenon is relevant for our purposes because there are languages where number too is a factor in determining when ergative marking occurs. For instance, in Dhirari (a language of South Australia), the first person singular receives ergative marking, whereas non-singular first persons do not. Similar facts hold for Arabana (related to Dhirari), Gumbaynggir (a language of New South Wales), and Aranda (a language of the Northern Territory). This pattern can be easily captured if we claim, as above, that singular pronouns are underspecified in these languages. In consequence, when they occur as the subject of transitive verbs, the full specification requirement will force them to receive an additional [+singular]. The ergative in these cases is the pronunciation of this extra number feature. This provides a second instance that shows that *we* has a larger feature specification than *I*, from which it follows that *we*

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<sup>9</sup>The ergative can also be restricted to certain tenses or constructions. In Georgian, for instance, it is restricted to (tenses constructed from) the past tense.

must be comprised of several features and so is non-primitive.

Again, recall that we are concerned with evidence for the relation of *we* to *I* in languages where the former is not constructed from the latter. To illustrate, briefly, for Aranda (Strehlow *circa* 1944: 91–92, diacritics removed), that ergative marking may reveal this even where the structure of the forms does not, observe that *jinga* ‘I’ does change in the ergative (*ata*), that *ilina* ‘we (two)’ and (*a*)*nuna* ‘we (more than two)’ do not, and that neither of the first two (*jinga*, *ata*) is a subelement of either of latter two (*ilina*, (*a*)*nuna*).

#### 4. Cognitive exhaustion

The evidence presented above converges on the view that *I* and grouphood are primitive notions and that *we* is constructed out of them. However, if we attempt to use this conclusion to decide between the non-reductionist and neo-reductionist accounts of collective intentions, there is an obvious counterargument to be faced, namely, that there is a primitive *we* concept, or *we*-intention concept, but that the grammatical systems concerned with the phenomena presented above do not have access to it. Absence of linguistic evidence for such a primitive does not evidence its absence from all cognitive systems (*cf.* the modularity hypothesis of Fodor 1983).

This counterargument relies on the view that features used to represent pronouns in grammatical systems do not exhaust all our pronoun-like concepts. We argue in this section that there is strong evidence against this position. That is to say, personal pronouns amount to nothing more than pronunciations of the features manipulated by the syntax, semantics, and morphology. We present two arguments, showing that there is an exact fit between the features posited by linguists and the pronominal inventories attested in natural languages. To explain the significance of this exact fit, and why it entails that *we* cannot be an independent pronominal primitive, we first discuss the nature of the lexicon, as a store for information that goes beyond purely featural content. In so doing, we describe the nature of the lexicon, one corollary of which is that *we*-intentions are highly unlikely primitives of our mental ontology. (This is an important aspect of the argument for researchers who, concerned the ontology of collective intentions, may wonder why they have wandered so deep into the domain of pronouns.)

At first glance, the claim that linguists’ features and languages’ pronouns match would seem unsurprising, as failure to match would indicate that linguists had not adequately accounted for their data. However, this is to misapprehend what features do in linguistics. If we look at the lexicon of any given language, we find words for many concepts: *cat*, *dog*, *fourteen*, *fifteen*, *blue*, *green*. It is, of course, a real task to explain the difference in meaning between these pairs of terms. However, the explanation of these differences does not rely on positing features, such as [ $\pm$ canine], [ $\pm$ even], [ $\pm$ primary]. Rather, features are only posited where there is evidence that a given distinction is made by the syntax or other grammatical systems. Non-featural distinctions, that is, ones that have no impact on the grammar, are said to reside in the lexicon (are ‘encyclopedic’ in the sense of Marantz 1997; see Fodor 1977 for an early formulation).

Let us explain this distinction in slightly more detail. To speak English competently, one must know the difference between *cat* and *dog*, *fourteen* and *fifteen*, and *blue* and *green*. However, the differences between these pairs are entirely irrelevant for syntax, semantics and morphology, the linguistic systems that depend on features, as we now illustrate:

**Syntactic phenomenon: passivization.** No language is known in which one can passivize verbs done to cats, but not ones done to dogs (that is, in which *The cat has been fed* is grammatical but *The dog has been fed* is not).

**Semantic phenomenon: quantifier scope.** No language is known in which *fourteen* may have wide-scope and narrow-scope readings, but *fifteen* only narrow-scope. That is, no language is known in which *All the girls know fourteen boys* might mean, in semi-formal notation, either  $[\exists_{14}y : B(y)] [\forall x : G(x)] (K(x, y))$  ‘There are fourteen boys—Andy, Billy, ..., Neddy, say—and all the girls in question know them’; or  $[\forall x : G(x)] [\exists_{14}y : B(y)] (K(x, y))$  ‘All the girls in question know fourteen boys, but each girl’s set of fourteen may be distinct’; however, for *fifteen* only the latter type of reading would be available,  $[\forall x : G(x)] [\exists_{15}y : B(y)] (K(x, y))$  ‘All the girls in question know fifteen boys, but each girl’s set of fifteen may be distinct’.

**Morphological phenomenon: ability to agree** (*e.g.*, reflect the singularity/plurality of a noun). Languages differ in whether, and when, adjectives agree: for instance, in German, the endings of the adjectives are different in *blaues/grünes Papier* ‘blue/green paper’ *versus* *blaue/grüne Papiere* ‘blue/green papers’; however, the adjectives are invariant in the English translations. Thus, German adjectives agree, but English ones do not. Such morphological differences are common. However, no language has been found where *blue*, and related hues, agree but *green*, and related hues, do not.

Being grammatically inert, the differences between *cat* and *dog*, *fourteen* and *fifteen*, and *blue* and *green* are not featurally represented. Instead, they are confined to the lexicon.

The counterargument with which we began suggests that pronouns and *we*-intentions might be like animals, numerals, and colors: they might be characterized by differences in meaning that are represented in the lexicon but not in the feature system. If this were the case, then failure to find featural evidence for the primitiveness of *we* might indeed still leave open the possibility that *we*, or *we*-intentions, are primitive in other cognitive systems. We reject this position for the following reasons. (We concentrate first on primitive *we*, from which the argument against primitive *we*-intentions emerges naturally.)

First, the most complex person systems that languages attest comprise four distinctions. We illustrate this with the dual-number pronouns of Tok Pisin (Papua New Guinea; Foley 1986), which, as an English-lexified creole, makes these differences in meaning particularly apparent to English speakers (we have added hyphens to highlight the constituent parts).

first inclusive	<i>yu-mi-tu-pela</i>	(me + you)
first exclusive	<i>mi-tu-pela</i>	(me + him/her)
second	<i>yu-tu-pela</i>	(you two)
third	<i>em-tu-pela</i>	(they two)

There are, however, several pronominal meanings beyond these four that languages could plausibly distinguish in the lexicon. One such is ‘you’ where all addressees are present, *versus* ‘you’ where only some are. Notice that this is near the very frequent crosslinguistic distinction in object deixis: that near me, and that far from me, *cf.* Scots *that hill, yon hill*; and it would be a linguistically practical device for creating group cohesion, a major factor influencing linguistic usage (and the object of study of most of sociolinguistics). Extensive surveys have found no evidence of any such lexicalization (Cysouw 2003). More striking in connection to this study, is the absence of a ‘choric’, or ‘mass’, *we*. A sentence like *We ran the race* can be true in two quite different senses: if the race was a marathon, then every member of the group ran individually; if the race was a relay, then every member of the group cooperated. Failure of one person in the relay scuppers the race; failure of one person in the marathon does not (*cf.* the pouring-stirring scenario of Searle 1990 and the duet-singing of Bratman 1992). Group supplication (in the form of prayer, or petition writing) is another scenario where the existence of such pronouns is plausible. However, extensive surveys have again found no language in which such choric or mass *we* is specially lexicalized (Cysouw 2003, Siewierska 2004). The fact that such plausible pronouns do not exist argues strongly that the lexicon does not contain any pronouns beyond those that the linguistically relevant features permit.

However, a stronger result obtains, concerning the sets of pronouns that a language may contain. Obviously, not all languages make so many distinctions in their pronouns as Tok Pisin. English makes only three distinctions, conflating first inclusive and first exclusive into a general first person (*we*). Other languages have even more impoverished pronominal systems: for instance, Winnebago conflates first inclusive, first exclusive, and second person (*i.e.*, English *we* and *you*) under *nee* and uses *'ee* for third person only. Let us call the English system a tripartition, and the Winnebago system, a bipartition. Logically, there are 6 possible tripartitions, and 7 possible bipartitions. Of these, only 1 tripartition and 2 bipartitions are attested.

Harbour (2006b) models such variation by proposing three features, all of which are used in the most complex system (quadripartition). Given three features, there are eight possible subsets of features. Harbour shows that each of these sets is used by some language. This result is important, as it means that the feature inventory generates only attested sets of pronouns. If, as the counterargument proposes, *we* were a separate, primitive concept, capable of independent lexicalization, then it could be added along side any feature system. As we already have a feature set that generates all the attested systems, adding an extra primitive is unnecessary. Moreover, given that the feature set generates only the attested systems, adding an extra primitive predicts unattested systems. This is a major problem as the avoidance of overgeneration is a core explicandum of feature systems, which has eluded previous researchers (*e.g.*, Noyer 1992, Halle 1997, Harley and Ritter 2002).

Now, implicit in the first argument against primitive *we*—that choric *we* is never lexicalized—is the assumption that useful concepts have a propensity to be lexicalized. It is striking, then, that literature on pluractionality and on the expression of intention has noted no language in which *we*-intentions receive specialized lexical expression. This certainly cannot be because the concept is not useful (non-useful concepts rarely spawn their own research domains), nor because it is so arcane that we are generally unaware of collective intentions (witness our ready ability to appreciate that Tuomela and Miller’s three-point account founders on Nash equilibria). It is genuinely surprising, then, that no language has different means of expressing our having a *we*-intention (to make hollandaise sauce cooperatively, say) *versus* our all having distinct individual intentions (to make separate batches of hollandaise). Rather, the means that languages employ to express collectivity are not specific to the expression of *we*-intentions; instead, they are more general elements that may be coopted for such usage. For instance, *together*, though it may express the *we*-intention of *We’re making hollandaise (together)* may equally characterize such non-intentional situations as *The shoes are lying together at the top of the stairs* and *I can’t put the pieces back together* (similarly, *jointly* occurs in such non-intentional, but nonetheless related, uses as *jointly distributed variables* and *these origins lie jointly in social requirements of human groups and in the fecundity of liminal experiences*).<sup>10</sup>

This argument therefore replicates that made at the end (second last paragraph) of section 3.1. It too shows that positing *we*-intentions as conceptual primitives leads to unsubstantiated expectations about the structure of natural languages. However, the current argument is much stronger and more general than the earlier version. The earlier version made assumptions about the relationship between the mental ontology of collective intentions and the structure of pronouns, and it gained force only in comparison to the neo-reductionist view, which fared well under the same assumptions; nonetheless, it remained open to *we*-primitivists to reject these assumptions. Here, however, the argument applies to the expression of *we*-intentions in language *tout court*, not through the narrow lens of pronoun structure, and we find that the purportedly primitive concept is unexpressed even where languages exercise their greatest expressive freedom with respect to concepts, namely, in the lexicon.<sup>11</sup>

We therefore reject the counterargument that primitive *we* exists and are similarly sceptical that *we*-intentions are primitive, unanalyzable elements of our mental ontology.

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<sup>10</sup>Although no language distinguishes a special *we* concept, some languages do distinguish between collective readings and non-collective readings of plurality verbs. Strikingly, where languages make this distinction, it is multiple individual intentions, not joint intentions, that receive special expression. A ‘distributive’ is added in order to indicate that each member of the plurality is acting individually. However, like the English word *together*, the distributive is not confined to expression of intention but may generally apply to non-intentional actions and to actions that are diffuse in ways other than being performed separately by the members of a group (for instance, by being performed at distinct times or locations).

<sup>11</sup>One might wonder whether the team reasoning is expected, by parity of argumentation, to receive some special lexical expression. However, beyond the specialized world of logic and philosophy, means of reasoning are never lexically expressed: languages do not express whether an assertion has been arrived at by *modus ponens*,  $\exists$ -*elimination*, and so on. That is, means of reasoning are not concepts in the sense with which the lexicon is concerned.

## 5. Conclusion

Two distinct theories of collective intentions, the non-reductionist position of Searle (Searle 1990, Searle 1995) and neo-reductionist position of Bacharach (2006) and Gold and Sugden (2007), are equally able to avoid the problem that afflicts earlier reductionist accounts, the failure to distinguish collective intentions from coincidentally harmonized ones. With respect to their core data, both theories appear equally matched. To evaluate the differences between them, we have broadened the discussion of mental ontology to include the kinds of primitives that are relevant to linguistic theory. The primitives posited by neo-reductionist accounts, namely, *I* and *group*, find direct and diverse support from linguistic theory, which speaks strongly in favor of such accounts. The primitives posited by non-reductionist accounts, namely, *we*-intentions, or possibly *we*, enjoy no corroboration from linguistic theory, nor from the structure of the lexicon, and lead to expectations that are strikingly unsubstantiated. We believe, therefore, that Bacharach's and Gold and Sugden's account of collective intentions in terms of the primitives *I* and *group*, and the process of team reasoning, to be the best substantiated position.

## References

- Adger, David and Harbour, Daniel. 2007. Syntax and syncretisms of the Person Case Constraint. *Syntax* 10:2–37.
- Anagnostopoulou, Elena. 2003. *The Syntax of Ditransitives: Evidence from Clitics*. Berlin: Mouton de Gruyter.
- Bacharach, Michael. 2006. *Beyond Individual Choice*. Princeton, NJ: Princeton University Press.
- Bardsley, Nicholas. 2007. On collective intentions: collective action in economics and philosophy. *Synthese* 157:141–149.
- Becker, Benjawan Poomsan. 2006. *Thai-English/English-Thai Dictionary*. Bangkok: Paiboon Publishing, 4th edition.
- Béjar, Susana and Řezáč, Milan. 2004. Cyclic agree, ms, University of Toronto. Online as LingBuzz 000079.
- Benveniste, Emile. 1966. *Problèmes de linguistique générale*. Paris: Gallimard.
- Bratman, Michael. 1992. Shared cooperative activity. *The Philosophical Review* 101:327–341.
- Bratman, Michael. 1993. Shared intention. *Ethics* 104:97–113.
- Chappell, Hilary. 1996. Inalienability and the personal domain in Mandarin Chinese discourse. In Hilary Chappell and William McGregor, eds., *The Grammar of Inalienability: A Typological Perspective on Body Parts and the Part–Whole Relation*, 465–527, Berlin: Mouton de Gruyter.

- Colman, Andrew M., Pulford, Briony D., and Rose, Jo. 2008. Collective rationality in interactive decisions: Evidence for team reasoning. *Acta Psychologica* 128:387–397.
- Corbett, Greville. 2000. *Number*. Cambridge: Cambridge University Press.
- Corbett, Greville. 2006. *Agreement*. Cambridge: Cambridge University Press.
- Cysouw, Michael. 2003. *The Paradigmatic Structure of Person Marking*. Oxford: Oxford University Press.
- Davidson, Donald. 1967. Truth and meaning. *Synthese* 17:304–323, reprinted in Donald Davidson, 1984, ed., *Inquiries into Truth and Interpretation*, 17–36, Oxford: Clarendon Press.
- Davidson, Donald. 1973. Radical interpretation. *Dialectica* 27:313–328, reprinted in Donald Davidson, 1984, ed., *Inquiries into Truth and Interpretation*, 125–139, Oxford: Clarendon Press.
- Fodor, Janet. 1977. *Semantics: Theories of Meaning in Generative Grammar*. New York, NY: Thomas Y. Crowell Company.
- Fodor, Jerry. 1983. *Modularity of Mind: An Essay on Faculty Psychology*. Cambridge, MA: MIT Press.
- Foley, William. 1986. *The Papuan Languages of New Guinea*. Cambridge: Cambridge University Press.
- Gilbert, Margaret. 1989. *On Social Facts*. London and New York: Routledge.
- Gold, Natalie and Sugden, Robert. 2007. Collective intentions and team agency. *Journal of Philosophy* 104:109–137.
- Green, Tom. 1992. Covert clause structure in the Miskitu noun phrase. Ms, Massachusetts Institute of Technology, Cambridge, MA.
- Halle, Morris. 1997. Distributed Morphology: Impoverishment and Fission. In Benjamin Bruening, Yoonjung Kang, and Martha McGinnis, eds., *MIT Working Papers in Linguistics 30: PF: Papers at the Interface*, 425–449, MIT, reprinted in Jacqueline Lecarme and Jean Lowenstamm and Ur Shlonsky, 2003, eds., *Research in Afroasiatic Grammar: Papers from the Third Conference on Afroasiatic Languages, Sophia Antipolis, France 1996*, 125–150, Amsterdam: Benjamins.
- Harbour, Daniel. 2006a. A feature calculus for silverstein hierarchies, talk presented at Harvard-Leipzig-MIT *Workshop on Morphology and Argument Encoding*.
- Harbour, Daniel. 2006b. Person hierarchies and geometries without hierarchies or geometries. Presentation at Leipzig Morphology Colloquium. Available as Queen Mary's OPAL #6.
- Harbour, Daniel. 2007. *Morphosemantic Number: From Kiowa Noun Classes to UG Number Features*. Dordrecht: Springer.

- Harley, Heidi and Ritter, Elizabeth. 2002. Person and number in pronouns: A feature-geometric analysis. *Language* 78:482–526.
- Harsanyi, John and Selten, Reinhard. 1988. *A General Theory of Equilibrium Selection in Games*. Cambridge, MA: MIT Press.
- Haspelmath, Martin. 2002. Explaining the ditransitive person-role constraint: A usage-based approach. *Constructions* (www.constructions-online.de).
- Jones, T. J. Rhys. 1991. *Welsh: A Complete Course for Beginners*. Teach Yourself Books, Sevenoaks, Kent: Hodder and Stoughton.
- Marantz, Alec. 1997. No escape from syntax: don't try morphological analysis in the privacy of your own lexicon. In A. Dimitriadis, L. Siegel, C. Surek-Clark, and A. Williams, eds., *PWPL 4.2, Proceedings of the 21st Annual Penn Linguistics Colloquium*, 201–225, Pennsylvania: University of Pennsylvania Working Papers in Linguistics.
- Montague, Richard. 1970. Universal grammar. *Theoria* 36:373–398, reprinted in Thomason (1974), pp. 222-246.
- Nakanishi, Kimiko and Tomioka, Satoshi. 2004. Japanese plurals are exceptional. *Journal of East Asian Linguistics* 13:141–179.
- Nevins, Andrew and Săvescu, Oana. 2008. An apparent Number-Case Constraint in Romanian: The role of syncretism. Paper presented at the 38th Linguistic Symposium on Romance Languages, Urbana-Champaign, IL.
- Ngô, Như Bình. 1999. *Elementary Vietnamese*. Boston, MA: Tuttle Publishing.
- Noyer, Rolf. 1992. *Features, Positions and Affixes in Autonomous Morphological Structure*. Cambridge, MA: MITWPL.
- Searle, John. 1990. Collective intentions and actions. In Philip Cohen, Jerry Morgan, and Martha Pollack, eds., *Intentions in Communication*, 401–415, Cambridge, MA: MIT Press.
- Searle, John. 1995. *The Construction of Social Reality*. New York, NY: Free Press.
- Siewierska, Anna. 2004. *Person*. Cambridge: Cambridge University Press.
- Strehlow, Theodore. circa 1944. *Aranda Phonetics and Grammar*. Number 7 in The Oceania Monographs, Sydney, NSW: Australian National Research Council.
- Thomason, Richmond H., ed. 1974. *Formal Philosophy: Selected Papers of Richard Montague*. New York: Yale University Press.
- Tuomela, Raimo and Miller, Seamus. 1988. We-intentions. *Philosophical Studies* 53:367–389.