Structural causal pluralism and underspecification in the expression of causation

An implicit question in much of the research on the linguistic expression of causation is how the latter might be related to the underlying concept of CAUSE. A better understanding of this relationship is important if we are to explain how the syntax-semantics interface is related to non-linguistic thought. In this research we examine a set of phenomena that suggest that the relationship between the linguistic expression of causation and the concept of CAUSE (as analyzed in much philosophical discussion of causation) is not straightforward; that different expressions of causation might be related to different concepts of causation, as reflected in where in the syntactic tree the expression of causation is specified.

We focus here on two different morphosyntactic realizations of causal meaning: verbs that directly express causal meaning (*cause, enable, prevent, affect,* e.g.*)* and clausal connectives (*because, although, e.g.).*The kinds of causal meanings that can be represented in these different morphosyntactic realizations show some differences and some similarities. Notably, there is the possibility (as in English) for a verb to have a dedicated 'enable' meaning: e.g., *enable, help, assist.* This is not so for causal connectives (Wolff, Klettke, Ventura, & Song, 2005), even crosslinguistically (Dixon & Aikhenvald, 2009). Instead there is only the possibility of a morpheme such as *because* which is vague as to whether its complement is a cause, as is exemplified in (1a), or an enabling condition, as exemplified in (2a). The falsity of (1b) and (2b) shows that the verbs *enable* and *cause* are not vague in this way; their subjects can only be a true enabling condition or cause.

(1) a. Lance lost in the second stage **because** of a broken chain.
b. #A broken chain **enabled** Lance to lose in the second stage.
(2) a. Lance won the Tour de France seven times **because** he took drugs.
b. #Drugs **caused** Lance Armstrong to win the Tour de France seven times.

There *are* verbs that are vague between 'cause' and 'enable' meanings, such as *result (in)* or *lead (to),* and even verbs such as *affect* that are vague among 'cause', 'enable', and 'prevent' meanings:

(2) a. America's intelligence failures **resulted in** 9/11. 'caused'/ 'enabled'/ *'prevented'
b. Forest fires **affect** biodiversity. 'cause'/ 'enable'/ 'prevent'

There are no clausal connectives that are three-way vague like *affect,* possibly related to the fact that there is no analogue to *prevent* among clausal connectives (though *although* and similar are perhaps analogous to *hinder, hamper,* etc.).

These patterns of realization may be explained by the existence of two general ways of thinking about causation. According to *causal pluralism* (Cartwright, 2004; Godfrey-Smith, 2010; Psillos, 2009; Hall, 2004; Hitchcock, 2003; Lakoff & Johnson, 1999), people have more than one concept of causation. On one concept, causation is simply a *dependency*, that is, a relationship in which the presence of a cause in some way makes a difference—e.g. counterfactually (Lewis, 1973) or probabilistically (Hitchcock, 2010)—to the effect. According to another concept, causation is a *production*, that is, a transferrence or transmission of conserved quantities such as energy or force (Kistler, 2006; Copley & Wolff, 2014). As Copley and Wolff (2014) point out, dependency accounts of causation are compatible with a wide range of causal relations, crucially relate causation to relations between/among propositions, and fail to easily differentiate CAUSE and ENABLE, while production accounts generally distinguish CAUSE and ENABLE (e.g., Talmy, 1988, Wolff, 2007), and relate causation not to relations between propositions, but to properties or configurations of the causal events themselves. From a causal pluralism view, the difference between connectives and verbs reflects these different concepts of causation. Given the emerging picture of phrase structure as being divided into separate domains (Cinque 1999,

Grohmann 2003, Platzack 2010, Ramchand & Svenonius 2013), with events/actions/forces relevant lower down and propositions/discourse relevant higher up, we hypothesized that causal pluralism is structurally mediated: the expression of causation higher in structure (as in clausal connectives) is based on the dependency concept, and the expression of causation lower in the structure (as in verbs) is based on the production concept.

However, if indeed *because* is vague because it reflects a dependency theory of causation in a structurally-mediated causal pluralism, this raises the question of why causal verbs such as *result in* are also vague; this is not necessarily predicted by the hypothesis of structural causal pluralism, in which causal verbs reflect a production theory. To make sense of this fact, we further hypothesized that vague verbs do reflect a production theory but involve underspecification of the tendency of the patient. In Talmy's (1988) force dynamic theory of verbal meanings, a causal relation can involve forces or tendencies associated with the agent and the patient. The force associated with the patient might either influence the patient towards (ENABLE) or away from (CAUSE) an endstate. When the patient's tendency is not specified in the meaning of the expression, the expression is potentially compatible with both CAUSE and ENABLE relations. Thus (A): vague verbs and connectives should both fail to distinguish CAUSE and ENABLE, but (B): for different reasons; the former because of patient tendency underspecification, the latter due to utilizing the dependency concept of causation, as per structural causal pluralism.

Two experiments (Exp 1, N=24; Exp 2, N = 80) were conducted to test this hypothesis, in which we manipulated the depiction or non-depiction of the patient tendency. Subjects saw animations and were asked rate the acceptability of different possible descriptions of the situation, including statements with more specific causal verbs, such as *What the officer did* ***enabled/caused*** *the woman to walk across the street*, comparing them to vague causal verb statements, such as *What the officer did* ***resulted in*** *the woman walking across the street* (Exp. 1) and to clausal connective statements such as *The woman walked up to the man* ***because*** *the officer directed her to do so* (Exp. 2). In each animation, a police officer directed a person to cross a street. In the tendency-specified condition, the person indicated where she wanted to go. If the officer directed the person in the same direction as the person wanted to go, it was expected that participants would be willing to endorse the *enable* statement. If the police officer directed the person in a different direction from where they wanted to go, it was predicted that people would be willing to endorse the *cause* statement. In the tendency-underspecified condition, the person did not indicate where she wanted to go.

As predicted by part (A) of the hypothesis, when information about the patient was clear, participants preferred descriptions involving *enable* and *cause*. When information about the patient was not available, people made use of less specific verbs like *result in* or connectives like *because*. Part (B) was also borne out: *result in* was sensitive to the presence of a tendency but *because* was not. That is, when the tendency was specified, *result in* was less acceptable than when it was not specified; *because* was just as acceptable when the tendency was specified as when it was not. These results support the hypothesis of structural causal pluralism with patient tendency underspecification for vague causal verbs.

Selected References: **Copley, B. & P. Wolff. 2014.** Theories of causation can and should inform linguistic theory. In B. Copley and F. Martin (eds.), *Causation in Grammatical Structures,* OUP. **Dixon, R., & Aikhenvald, A. (eds.). 2009.** *The semantics of clause linking: a cross-linguistic typology*. OUP. **Godfrey-Smith, P. 2010.** Causal pluralism. In H. Beebee, C. Hitchcock, & P. Menzies (Eds.), *Oxford Handbook of Causation* (pp. 326 – 337), OUP. **Hall, N. 2004.** Two concepts of causation. In J. Collins, N. Hall, and L. A. Paul (eds.), *Causation and Counterfactuals*. MIT Press.