

## Hitting the nail on the head: Forces in verb meanings

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There is a growing recognition of the role of forces in verb meanings, starting with the seminal work of Leonard Talmy (Talmy 1985). In one line of research these forces are analyzed in terms of vectors, with a magnitude and spatial direction and interactions describable in vector-algebraic ways. This has been fruitfully applied by Phillip Wolff in the analysis of causative verbs like *enable* and *prevent* (e.g. Wolff 2007) and by Pross & Roßdeutscher (2015) in the analysis of the verb *ziehen* ‘pull’. We want to contribute to that line by studying a larger set of verbs (in German) exhibiting some degree of force exertion (e.g. *schlagen* and *drücken*, cf. 1+2) in order to find out what role force vectors play. We do not only look into their lexical semantics, but also into their compositional semantics, particularly into the modifiability by the force adverbs *hart* and *leicht* and into the combination with prepositions (e.g. *ziehen an* vs. *drücken auf*, cf 3+4). We offer a semantics of such verbs in which events, forces, and paths are brought together in a coherent way. We want to explore how this can help us understand why the specification of a result can sometimes make the force vector inaccessible for modification (*hart schlagen* versus *?hart einschlagen*, cf 5+6).

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| (1) Chris schlägt Alex auf den Arm.<br>Chris hits Alex on the arm.           | (2) Alex drückt gegen die Tür.<br>Alex pushes against the door.            |
| (3) Alex zieht an der Tür.<br>Alex pulls on the door.                        | (4) Chris drückt auf den Tisch.<br>Chris pushes on the table.              |
| (5) Chris schlägt Alex hart auf den Arm.<br>Chris hits Alex hard on the arm. | (6) ??Alex schlägt das Fenster hart ein.<br>??Alex breaks the window hard. |

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Wolff, P. (2007). Representing causation. *Journal of Experimental Psychology. General*, 136(1), 82–111.