

Appendix B: Input Languages

This appendix was adapted from a similar pre-registered file (<https://osf.io/ya2ps/>) and includes a detailed description of each of the 10 input languages used in the experiment.

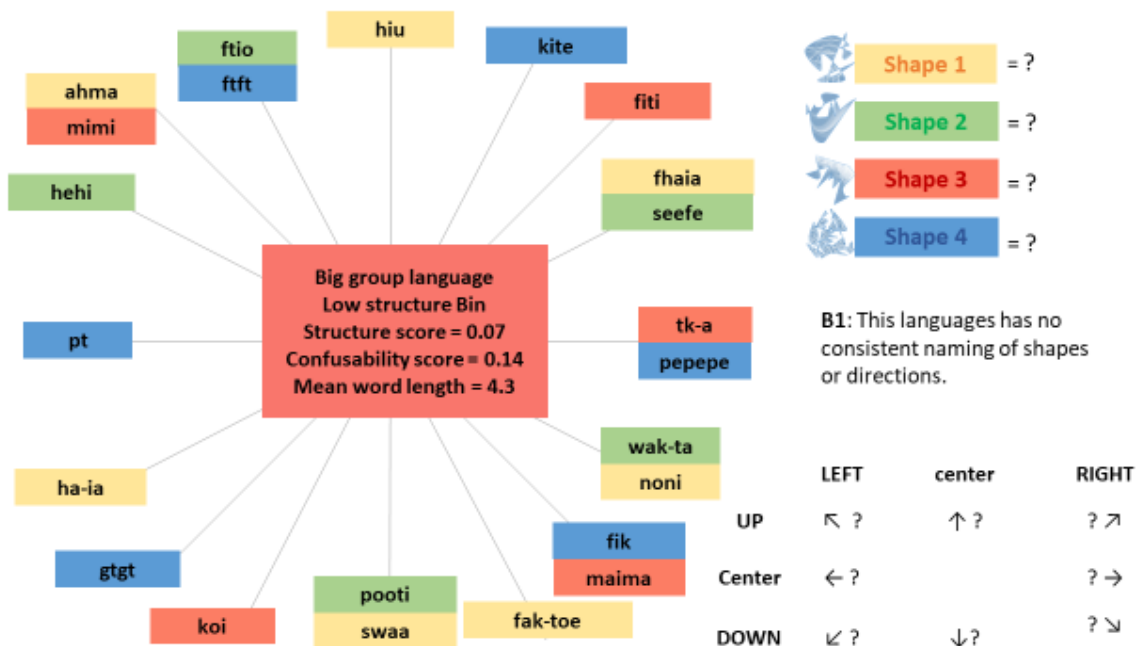
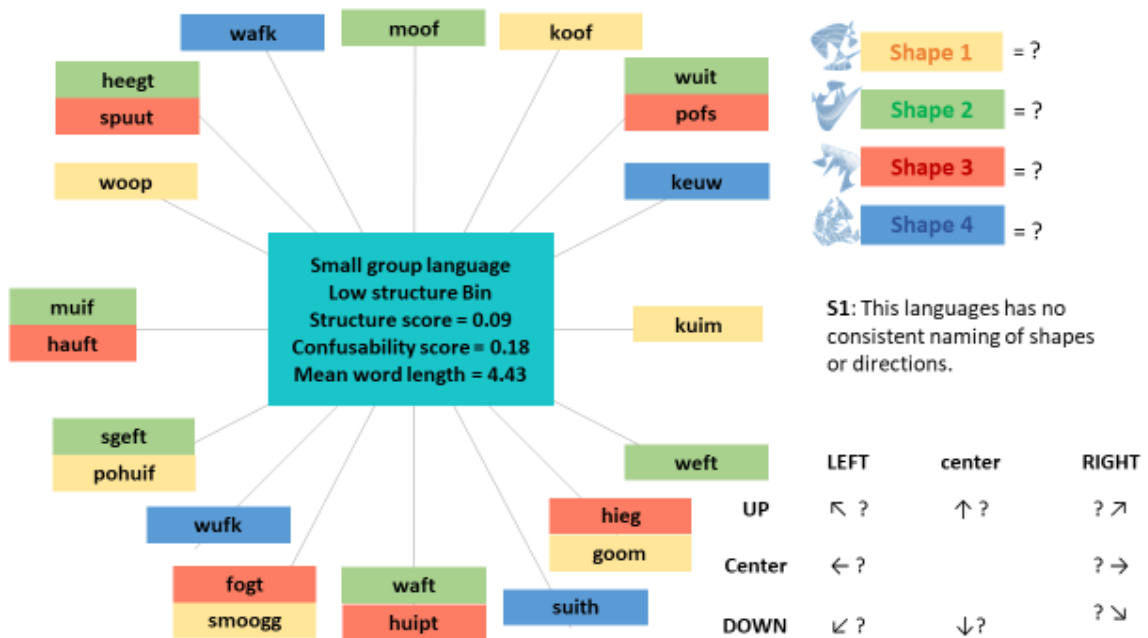
Each language is characterized by a short description, as well as its structure score, confusability score, and average word length.

Each language is accompanied by a “dictionary” for interpreting the language on the right.

Different box colors represent the four different shapes which appeared in the scenes, and the grey axes indicate the direction in which the shape was moving on the screen.

Different font colors represent different meaningful part-labels, as segmented by the authors.

Low structure bin (1)

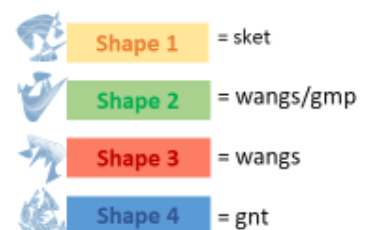


Low-Mid structure bin (2)



S2: Some part-labels repeat more with certain shapes than with others, but there is still no clear labeling for shapes (e.g., *kion* and *weg* are used for multiple shapes). The directions down-left and down-right are consistently labelled, but there is no consistent labeling for any of the other directions, and the same endings repeat without clear rules.

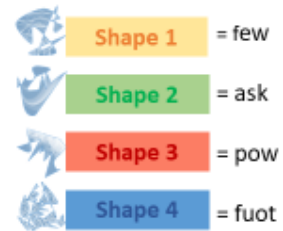
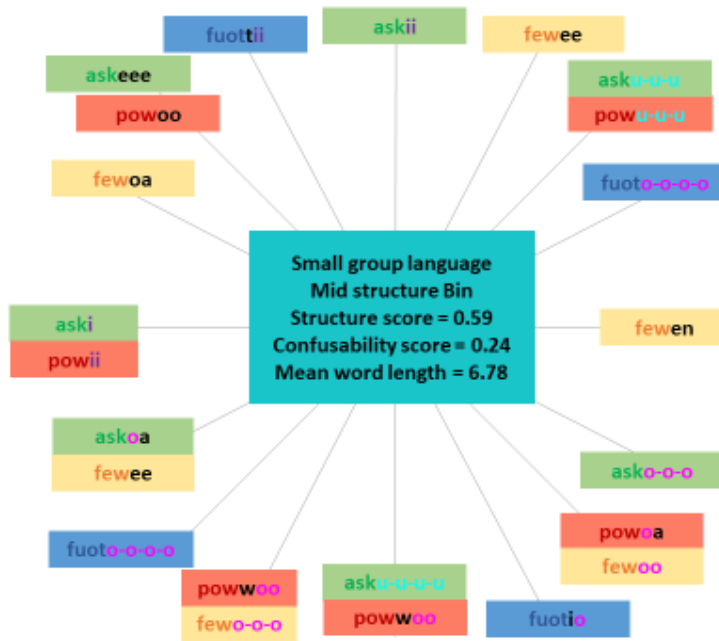
| | LEFT | center | RIGHT |
|--------|------|--------|-------|
| UP | ↖ ? | ↑ ? | ? ↗ |
| Center | ← ? | | ? → |
| DOWN | ↙ a | ↓ ? | i ↘ |



B2: Some part-labels repeat more with certain shapes than with others, but there is still no clear labeling for shapes (e.g., *wangs* is used for multiple shapes). There is little structure in the labelling of directions (some repetitions of *uu* for down-left, and *i* for one direction in the down-right quadrant, but no clear structure for motion otherwise).

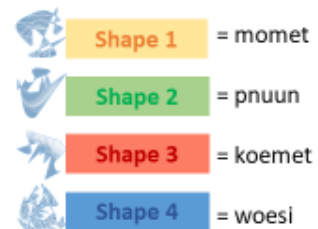
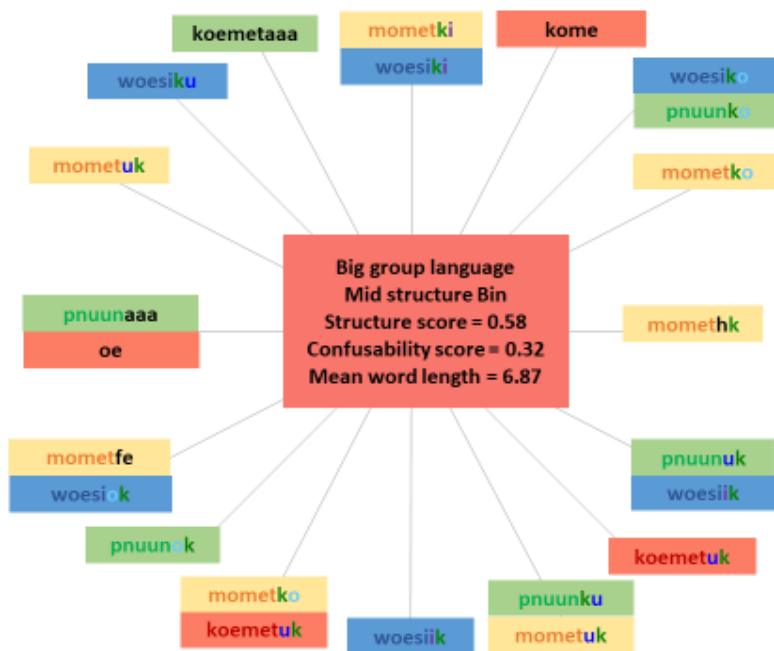
| | LEFT | center | RIGHT |
|--------|------|--------|--------|
| UP | ↖ ? | ↑ ? | ? ↗ |
| Center | ← ? | | ? → |
| DOWN | ↙ uu | ↓ ? | uu/i ↘ |

Medium structure bin (3)



S3: All shapes are consistently labeled with the same part-words. However, there is no clear way to label directions. The same vowels are always added to the end of words, but with only partially consistent structure (e.g., o-o is used for up-right, down-right and down-left).

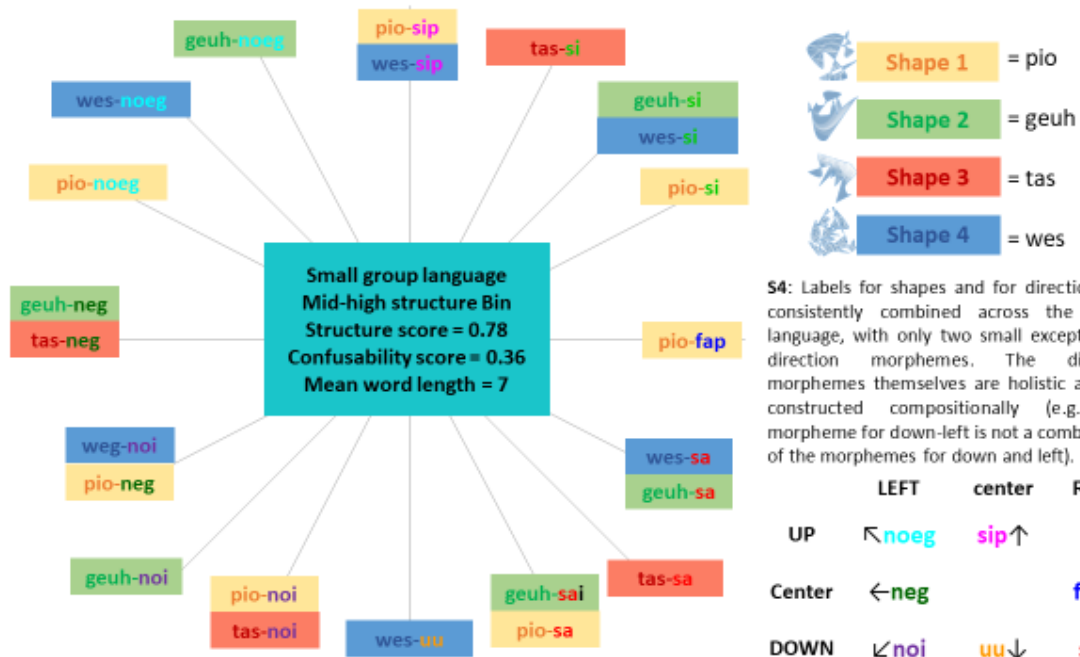
| | LEFT | center | RIGHT |
|--------|-------|--------|-----------|
| UP | ↖ ? | ↑ ? | ↗ u-u-u ↗ |
| Center | ← i | | ? → |
| DOWN | ↙ o-o | ↓ ? | ↘ o ↘ |



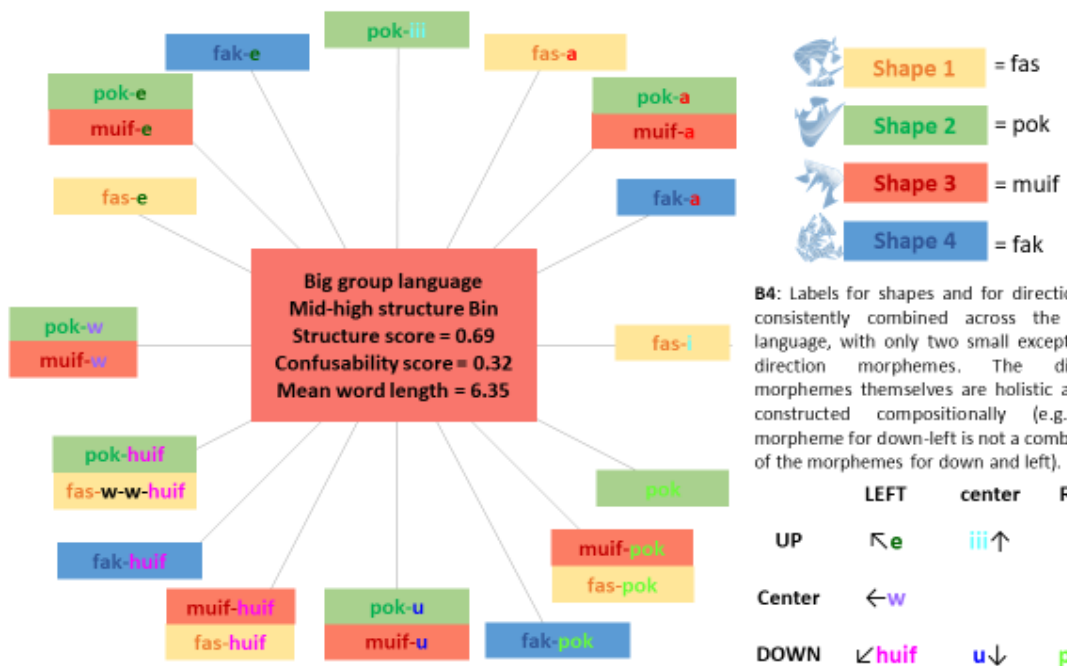
B3: Labeling of shapes 1 and 4 is fully consistent, but only partly consistent for shapes 2 and 3. There is some structure in the labeling of directions, with mirroring the order of part-labels for opposite directions (ik, ki, ko, ok), yet it is not fully consistent.

| | LEFT | center | RIGHT |
|--------|------|--------|--------|
| UP | ↖ ? | ↑ ki | ↗ ko ↗ |
| Center | ← ? | | ? → |
| DOWN | ↙ ok | ↓ ik | ↘ uk ↘ |

Mid-High structure bin (4)

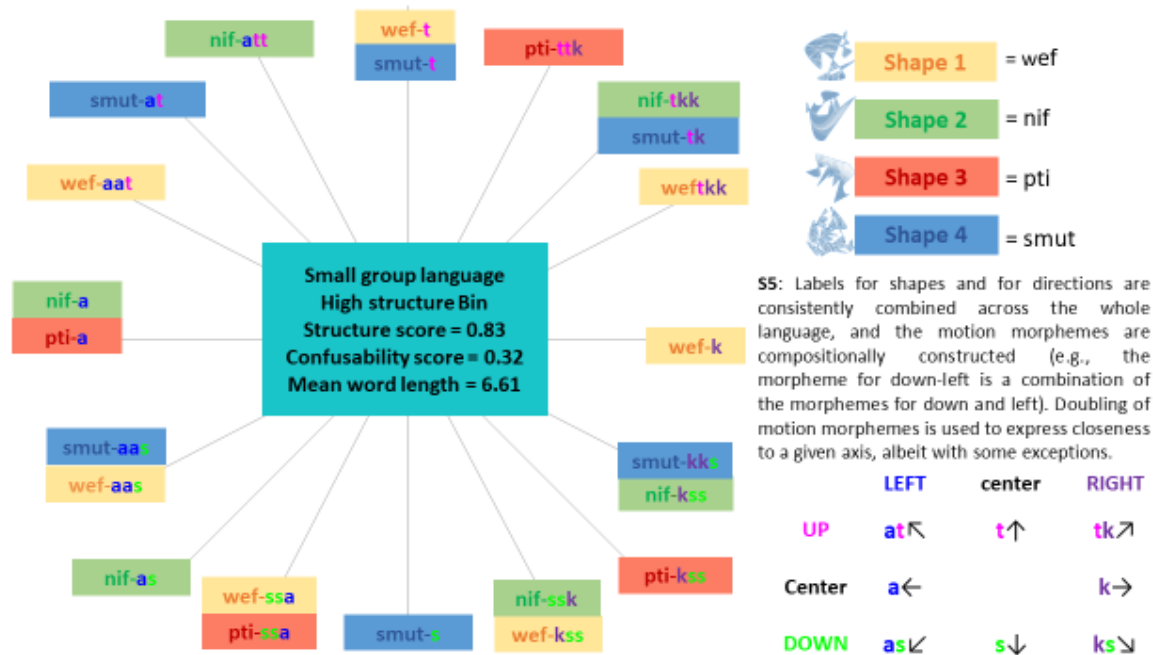


S4: Labels for shapes and for directions are consistently combined across the whole language, with only two small exceptions in direction morphemes. The direction morphemes themselves are holistic and not constructed compositionally (e.g., the morpheme for down-left is not a combination of the morphemes for down and left).

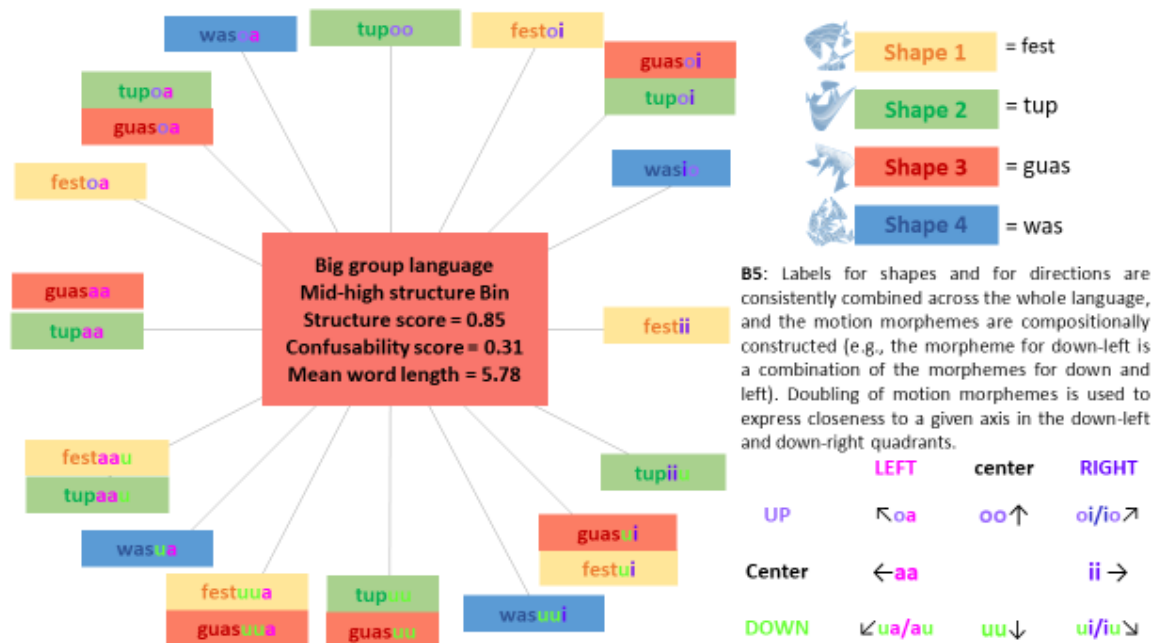


B4: Labels for shapes and for directions are consistently combined across the whole language, with only two small exceptions in direction morphemes. The direction morphemes themselves are holistic and not constructed compositionally (e.g., the morpheme for down-left is not a combination of the morphemes for down and left).

High structure bin (5)



S5: Labels for shapes and for directions are consistently combined across the whole language, and the motion morphemes are compositionally constructed (e.g., the morpheme for down-left is a combination of the morphemes for down and left). Doubling of motion morphemes is used to express closeness to a given axis, albeit with some exceptions.



B5: Labels for shapes and for directions are consistently combined across the whole language, and the motion morphemes are compositionally constructed (e.g., the morpheme for down-left is a combination of the morphemes for down and left). Doubling of motion morphemes is used to express closeness to a given axis in the down-left and down-right quadrants.