Do typical birds usually fly normally?

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'Birds fly, Tweety is a bird, does Tweety fly?' has become the canonical example to introduce default reasoning. Since its introduction many variations on this example, stretching from 'Birds normally fly...' (Lifschitz, 1988) to 'If something is a bird, then it flies...', (Schurz, 2002) appeared in the literature. All these sentences are believed to express the same default rule. But do they? In order to do proper experimental research on default reasoning, this is an important question to be answered.

Experiment

Fifty-one students in Psychology, without prior logic course, participated as a partial fulfilment of a course requirement. In case of occasionally left-open items (0.8%), the analysis was conducted with a lower n (minimal n= 46).

Each participant received a booklet with written instructions and 22 items in randomized order. They solved the paper-and-pencil task individually and in a self-paced manner. Each item consisted of a nonsensical rule, an affirmation of the first part, and a question about the second part (see Table 1). Below the question, a seven point scale was drawn:

1	2	3	4	5	6	7
I Very Sure that I can't draw this conclusion	I Sure	I A bit Sure	I I I	I A bit Sure	I Sure that I can draw this conclusion	I Very Sure

All items were measured within the same participant group. We compared word placement (front vs. middle) for the items including the word typically, usually or normally. For all positive items, we compared the formulation type (if x then y vs. x are y). Finally, we compared the effect of the three words used to express a default (typically vs. usually vs. normally).

Results & Discussion

A MANOVA showed no main effect of word placing: Whether a specific word to express a default is placed in front or in the middle of a sentence does not influence its interpretation.

For positive items, we found a main effect of formulation (Rao R (7,37) = 3.7; p<.01).

Participants are slightly less sure of their inference from an 'if, then'-sentence (5.35) than of their inference from an 'x are y' sentence (5.42).

Most interesting is the main effect of the specific word that is used to express a default rule. For positive items, we find a clear order: Items with 'all' or without a word added score higher than the other items. Items with 'typically' score higher than items with 'usually' (Rao R(4, 40) = 7.6; p <.001) or 'normally' (Rao R(4, 40) = 11.6; p <.001). The latter two do not differ. For negative items, we find the reverse order: none < typically < usually = normally.

Table 1: Properties of the default rules and score.

Formulation	score
All Zillo are Ilter. Grofo is a Zillo. IsGrofo an Ilter?	6,8
If an animal is a Trendor, then it is a Gren. Studi is a Trendor. Is Studi a Gren?	6,3
Moggs are Crismo. Fold is a Mogg. Is Fold a Crismo?	6,8
If an object is a Hemler, then it typically/usually/normally is a Piro. Gif is a Hemler. Is Gif a Piro?	6/5/5,1
Typically/Usually/Normally, if an object is an Olos, then it is a Tir. Golk is an Olos. Is Golk a Tir?	5,1/4,9/4,9
Hilo are typically/usually/normally Waff. Jukk is a Hilo. Is Jukk a Waff?	5,9/5/4,6
Typically/Usually/Normally, Brant are Glent. Kerdo is a Brant. Is Kerdo a Glent?	5,9/5/4,7
Vlesd are no Pulk. Erza is a Vlesd. Is Erza a Pulk?	1,2
Kimd are typically/usually/normally no Lef. Eli is a Kimd. Is Eli a Lef?	1,8/2,6/2,5
Typically/Usually/Normally Mizo are no Letta. Vecko is a Mizo. Is Vecko a Letta?	2,1/2,5/2,4

The formulation of a default clearly influences its interpretation. Thus far, this was not taken into account in experimental research on the topic. These results imply a caveat for all cross-experimental comparisons in default reasoning.

References

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