Testing the Roles of Design History and Affordances in the HIPE Theory of Function

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Two views currently dominate theories of object function. According to the affordances view, function arises from an object's structure and use the object's design history is relatively unimportant. According to the historical view, function reflects the intention of an object's creator structure and use are relatively unimportant. A new view, the HIPE theory, integrates the affordance and historical views, proposing that function cumulatively requires history, goals, structure, and use to be complete (Barsalou, Sloman, & Chaigneau, in press; also see Chaigneau & Barsalou, in press; Chaigneau, Barsalou, & Zamani, 2002).

Three experiments in Chaigneau (2002) tested the HIPE theory. In each, participants read scenarios that described an artifact's design history and physical structure, along with an agent's goal and actual use. After reading a scenario, participants either rated how appropriate a name was for the object ("mop"), how well the scenario illustrated a category's function (mop), or how likely the scenario was to cause the functional outcome (sopping up spilled liquid). In the baseline scenarios, all four components were intact. In the critical scenarios, one or more components were compromised. Design history could be accidental instead of intentional; the goal to use the object for its function could be absent; the physical structure could be insufficient; the action could be insufficient.

As predicted, Experiment 1 found that compromising each component reduced an object's functionality relative to baseline, consistent with HIPE's prediction that all four components are cumulatively necessary for a complete function. However, compromising structure and use generally produced the largest decrements, consistent with the affordances view. Furthermore, design history was more important for naming than for function and causality judgments, consistent with the causal link between history and naming in historical theories.

Experiment 2 tested the historical view's assumption that design history is causally sufficient for function. If so, then compromising any other component after compromising history should have no effect. Compromising goals, however, produced an additional decrement, consistent with HIPE's cumulative view.

Experiment 3 explored the finding in recent experiments that history is more important than structure and use in naming (e.g., Gelman & Bloom, 2000; Matan & Carey, 2001). In these studies, however, the scenarios lacked sufficient detail about structure and use to derive affordances, thereby leaving history as the most informative factor. When sufficient information was provided so that participants could derive affordances, history became much less important for naming than structure and use.

Overall, these three experiments support three conclusions. First, function is a cumulative construct. Second, affordances are more central to this construct than history, although both are cumulatively important. Third, history is particularly important for naming, and less so for understanding function conceptually and reasoning about it causally.

Acknowledgement

References

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