

# A Computational Model of Voter - The Dynamics of Political Candidate Evaluation

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John Q. Public, a computational model of political cognition which incorporates both cognitive and affective mechanisms, is employed as a voter facing political campaign information. A series of hypothetical, computational experiments show that the model successfully reproduces a set of well-known empirical phenomena found in electoral research and research on political cognition. Specifically, in response to issue and candidate information, the model reproduces 1) practice, recency, and spreading activation effects on recall, 2) cognitive and attitude priming effects, 3) question order and wording effects in survey research, and 4) both on-line and memory-based processing.

Given the space limit, only some of axiomatic characterizations of the model and some of the simulation results were presented here. (For formal presentation and full discussion of the model and simulation results, see Kim, Lodge, & Taber, MPSA 2004 Conference Proceeding.)

## The Model

The model is built using ACT-R. Together with the cognitive mechanisms embedded in ACT-R, an affective, attitudinal mechanism was incorporated into the model based on a set of axioms, some of which are the following.

- (Hot Cognition) Most social concepts in memory are affectively charged. The affective evaluation linked to a concept in long term memory can be positive or negative or close to zero, indicating either a non-attitude or ambivalence. (Abelson, 1963)
- (Attitude Priming) The information in memory that is affectively congruent to the information being processed is more accessible. (Fazio, 1990)
- (Primacy of Affect) Affect can not only be triggered automatically without conscious appraisal of an attitude object, but also is primary in the sense that it comes into working memory before other conscious thoughts and appraisals enter into the judgment process. (Zajonc, 1980, 2001)
- (On-line and Memory-based Processing)
  - (Memory-based Processing) Different, often conflicting considerations and feelings that come to

mind on the spot influence the evaluations of objects. The accessibility of situational factors, together with the content and structure of prior beliefs determine what considerations and feelings come to mind on the spot.

- (Attitude Construction and Colorization) An attitude toward an object is constructed and/or updated continuously in real time. That is, it is colored by those thoughts and feelings that come to mind at the time of information processing.
- (On-line Processing) An affective summary evaluation (valence) is linked to every object in memory that has been evaluated in the past and is updated continuously on every exposure to new information, thereby reflecting the weighted influence from all momentarily accessible information. That is, the valence of the new information at the time of updating is colored by the respective valence of those thoughts and feelings elicited at the time of exposure.

## Computational Experiments and Results

The computational experiments consisted of three experiments that were identical except for the model's initial ideological beliefs - typical conservative, moderate, and liberal beliefs. The initial ideological beliefs were derived largely from the NES (National Election Survey) 2000. Within each experiment, an identical set of 24 pieces of campaign information were presented to the model, with varying order and wording and with three intervals. Important parameter values used for the experiments were: 1) anchoring and adjusting ( $\rho = 0.7$ ); 2) the parameter governing the effect of affective strength of chunks on their decay rates ( $\alpha = 0.1$ ); 3) affective congruence effect parameters. All other parameters were left to their 'common' values (e.g.  $d = 0.5$ ). In the below, some of the results were briefly presented.

The Figure 1 shows the changes in attitudes towards two fictitious candidates, James and Edwards, and two political parties, Republican and Democratic Parties, as the set of campaign information is processed (with moderate initial belief). As expected, the valence of attitudes towards and the preference over the objects change over time as the campaign information is integrated into the attitudes towards the objects. In the end, the model was slightly positive toward Democratic Party, slightly negative toward Republican Party, but positive towards

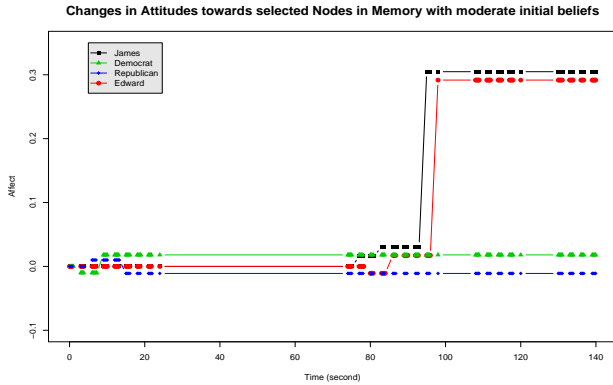


Figure 1: Changes in Candidate Evaluations Over Time

both candidates, though slightly preferring the Democratic candidate (James).

The Figure 2 shows the changes in full activation levels of two chunks, "James" and "Democrat", over time, which is the sum of base-level activation, spreading of activation, and the attitude priming effect.

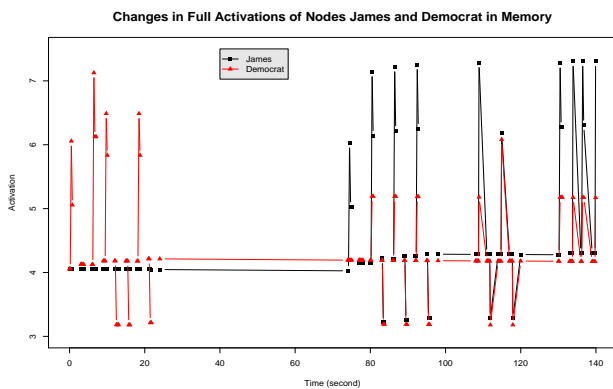


Figure 2: Changes in Full Activations over Time

The Figure 3 shows cognitive and attitude priming effects with liberal initial belief. It shows the full activation levels of four chunks in memory when the model processes the word "Republican" (i.e., "Republican" is a prime). At the moment of processing, "rich" was both semantically associated with and attitudinally congruent to the prime. "dumb" was only attitudinally congruent to the prime. "Edward" was not related to the prime in any way (a base case). "intelligent" was only attitudinally incongruent with the prime. Consistent with cognitive and attitude priming effects, the order of chunks in terms of their activation levels, from the highest to the lowest, were "rich", "dumb", "Edward", and "intelligent".

The Figure 4 shows a question order effect in survey response. It compares the expressions of attitudes toward the fictitious candidates with those when the information about candidates' party affiliations were presented

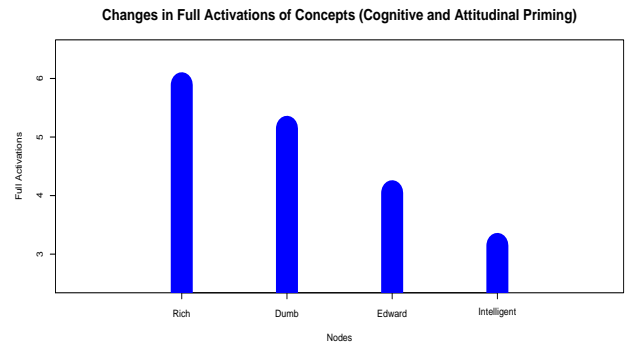


Figure 3: Activation Levels of Chunks with "Republican" as a Prime

later. When the information were presented later, the model's attitudes toward both James and Edward increased mainly due to the changes in influences of the information on its attitudes towards candidates.

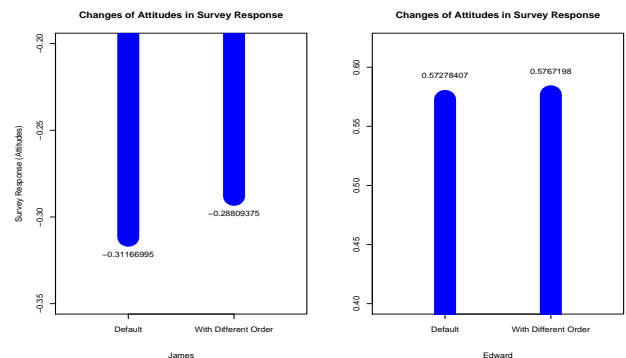


Figure 4: Changes of Attitudes due to Order Effect

## Acknowledgments

This paper is drawn from Kim, Lodge, & Taber (MPSA 2004 Conference Proceeding).

## References

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