



Cognitive and motivational factors driving sharing of internet memes

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Abstract

As naturally occurring examples of folk culture and creativity, internet memes provide a rich testbed to examine the interrelationships among cognitive and motivational factors that influence their impact. In two studies with participants recruited over the internet, we measured a variety of appraisals of both apolitical and political memes with a focus on the role of metaphorical aptness and personal relatability as predictors of comprehensibility and humor. Structural equation modeling was used to analyze interconnections among appraisals. A major network path connects relatability to aptness, which in turn is linked to appraisals of comprehensibility, humor, and propensity to share. For political memes, the congruity of the meme with the person's political position (liberal or conservative) has a powerful but indirect impact on the propensity to share it. These findings indicate that appraisals of memes are based on cognitive and motivational processes that also underlie metaphor comprehension and appreciation of humor.

Keywords Memes · Social media · Metaphor · Aptness · Humor · Politics

Introduction

Digital artifacts known as *memes* now pervade the internet (Davidson, 2012). Memes, which often though not always focus on political themes, typically take the form of humorous images or video clips hybridized with text, which are copied and reposted with variations. They are usually based on a visual image, which functions as the *source* (to borrow a term from the literature on analogy and metaphor). The meaning of the image is shifted to a new *target* topic by the addition of verbal text. Often the source and target are drawn from disparate semantic domains, creating a sense of incongruity and surprise. The patterns of virality among memes have been analyzed using big data available on open sources such as Google Trends (Bauckhage, 2011; Bauckhage, Kersting, & Hadji, 2013).

In part because of their often-contagious humor, memes can communicate social and political beliefs (Hakoköngäs, Halmesvaara, & Sakki, 2020), thereby playing a role in culture development and formation of collective identity (Gal, Shifman, & Kampf, 2016; Leach & Allen, 2017), and

influencing political movements (Milner, 2013; Ross & Rivers, 2017). Hakoköngäs et al. (2020) have argued that memes serve as tools to “crystallize” arguments in a compact, easily shareable form, providing a powerful tool for persuasion, mobilization, and reaching new audiences. Memes and other media appear to have been used purposefully to share political opinions about the 2016 US presidential election, even by those who were not extreme partisans (Huntington, 2020; Kim et al., 2018; Mihailidis & Viotty, 2017; Penney, 2017).

Here we report studies that explore the nature of the cognitive and motivational processes that guide the comprehension and perceived humor of memes, and that influence the propensity to share specific memes with friends and family. A guiding hypothesis is that internet memes constitute a variety of metaphor. The hypothesis has been considered in numerous fields, including communication, rhetoric, and linguistics (Huntington, 2013; Milner, 2016; Piata, 2016; Shifman, 2013). Metaphors, which are prevalent both in everyday language (Lakoff & Johnson, 1980) and in poetry (Holyoak, 2019; Lakoff & Turner, 1989), are typically verbal. Verbal metaphors have been shown to be effective in promoting conceptual change and development, perhaps because they elicit emotional responses (Pollio, Smith, & Pollio, 1990). The concept can be usefully extended to include visual metaphors, such as those expressed by some works of art (Kennedy, 2008). Internet memes in fact provide a readily accessible

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source of naturally occurring metaphors. Psychological studies of verbal metaphors have primarily involved artificial stimuli (metaphors created by research psychologists), or less commonly literary metaphors (generally created by elite writers) (Jacobs & Kinder, 2018; Stamenković, Ichien, & Holyoak, 2019, 2020). Internet memes, in contrast, are typically created, modified, and transmitted by “ordinary” individuals, and hence may provide a window into the nature of everyday creativity. Because memes are often political in nature, they offer a source of stimuli for investigating the political impact of metaphors (Thibodeau, Fleming, & Lannen, 2019).

Metaphor is closely linked to analogy, although the extent to which metaphor comprehension depends on analogical reasoning remains an open issue (for a recent review, see Holyoak & Stamenković, 2018). Like analogies, metaphors often involve relational parallels between the source and target. However, whereas analogies may be formal in nature, metaphors inevitably depend on semantic interpretation. Analogies focus on clarity of correspondences between the source and target; in contrast, good metaphors emphasize expressiveness (often including an emotional component) and semantic richness, as well as sensory detail (Gentner & Clement, 1988; Gentner, Falkenhainer, & Skorstad, 1988). These qualities of metaphors seem to match those of internet memes. Many theorists have argued that a critical dimension of variation among metaphors is *aptness*. A metaphor can be characterized as apt to the extent that the source is perceived as providing a unique and accurate description of the target – that is, salient properties of the source also apply to the target (Jones & Estes, 2006; Thibodeau & Durgin, 2011). Rated aptness is a strong predictor of the comprehensibility of metaphors, perhaps more potent than sheer familiarity or conventionality (Blasko & Connine, 1993; Chiappe, Kennedy, & Chiappe, 2003; Pierce & Chiappe, 2008). A structural alignment between source and target facilitates comprehension, and in addition also may affect how people think about policy issues (Thibodeau & Boroditsky, 2011).

An important property of internet memes that distinguishes them from many other metaphors is that memes are usually intended to be in some way humorous. It has been noted that humorous analogies (a closely related concept) can drive home a political argument (Gentner & Maravilla, 2018). The psychology of humor is a complex topic (for a review, see Ruch, 2008; for neural evidence, see Amir & Biederman, 2016), but a central hypothesis is that humor often depends on perception of incongruity (e.g., Deckers, 1993). Koestler (1964) introduced the term “bisociation” to refer to the juxtaposition of two normally disparate ideas, concepts, or situations in a surprising or unexpected manner. Of course, incongruity can be generated by purely random juxtapositions, which are seldom very funny. Humor seems to depend on satisfactory resolution of incongruity (Suls, 1972), which

depends on achieving comprehension, and hence is likely to require some degree of aptness. It has also been argued that appreciating humor involves relating one’s self to the situation, often yielding a sense of superiority within a social hierarchy (Gruner, 2000). Memes, like jokes in general, often act as “put downs” of whomever or whatever is the butt of the joke, and may be shared within in-groups to disparage out-group members (Guadagno, Rempala, Murphy, & Okdie, 2013). Similarly, political bloggers may share politically incongruent content if it serves the purpose in disparaging rivals (Wallsten, 2010).

Previous research has emphasized the emotional component of memes (Akram et al., 2020; Guadagno, Rempala, Murphy, & Okdie, 2013; Huntington, 2015; Leach & Allen, 2017; Rieger & Klimmt, 2019). Huntington (2020) has demonstrated that motivational reasoning impacts the appraisal of political memes, such that greater agreement with the message is associated with less scrutiny and greater perceived message effectiveness. The appraisal of a meme is therefore likely to depend on the degree to which the viewer relates to the attitude expressed by the meme (Akram et al., 2020). The impact of relatability is likely to be particularly evident in political memes (e.g., a meme expressing liberal superiority may be less funny to a conservative). An important question is whether the perceived aptness of a meme is itself influenced by its relatability – is aptness a basic property of a meme, or is “aptness in the eye of the beholder,” varying with the viewer’s point of view?

The current study focuses on the structural interrelationships among cognitive and motivational factors that might impact appraisals of the comprehensibility and humor of internet memes. Studies 1A and 1B examined apolitical internet memes. Study 2 examined political memes expressing liberal or conservative attitudes, and compared appraisals made by participants who identified as either politically liberal or conservative. In addition to comprehension and humor, Study 2 also assessed propensity to share a meme with others.

Studies 1A and 1B

These initial studies each examined a number of variants of two basic internet memes, with Study 1B serving as a replication and extension of Study 1A using two different basic memes. Because the pattern of results proved to be extremely similar across the two studies, we report them together, focusing on analyses of the combined data.

Method

Participants Participants were 200 (100 each in Studies 1A and 1B) Amazon Mechanical Turk workers located in the USA (62% male) who were between 18 and 72 years of age

($M = 36.51$, $SD = 10.83$). The sample size was comparable to that used in previous studies of metaphor comprehension (e.g., Blasko & Connine, 1993; Chiappe et al., 2003; Jones & Estes, 2006). Participants received \$2 compensation for participation in a study, which took about 5 min to complete. All studies were approved by the Institutional Review Board for the University of California, Los Angeles.

Materials Each study included two *basic* memes that each served as a meme template (i.e., a meme without text). In Study 1A the two basic memes were Distracted Boyfriend and Evil Kermit (see Fig. 1, top). Given the current study’s emphasis on the analogical and metaphorical framework, these basic memes were selected for their explicit text-to-image mappings (comparable to analogical mappings between source and target). The content of the memes was also vetted to avoid profanity. Based on these constraints, a set of 12 total variations of each basic meme was collected (for a total of 24 variations) from a variety of sources including Google Images, Twitter, and Reddit. To control for variations in text size, image rendering, and other image qualities, all variations were standardized in text and size. All text was in Arial, 14-point font to ensure readability. Memes for Study 1A were

collected in October 2018, and the study was conducted in November 2019. Memes for Study 1B were collected in January 2020, and the study was conducted in January 2020.

In Study 1B the two basic memes were Epic Handshake and Baby Yoda (see Fig. 1, bottom). As in Study 1A, 12 specific variants of each basic meme were collected from various internet sources. The display size for all variants of the Epic Handshake meme was standardized to $1,096 \times 616$ pixels, and that for the Baby Yoda meme was standardized to $616 \times 1,096$ pixels.

Measures Each participant was presented with two memes, and provided Likert-scale ratings for each in response to six questions, presented in the following order:

- (1) To gauge how humorous a meme appeared to be, participants were asked: “On a scale from 1 (not funny at all) to 8 (very funny), how funny did you find this?”
- (2) To measure prior exposure to the meme, participants were asked: “On a scale from 1 (not at all familiar) to 8 (very familiar), how familiar are you with this meme?”
- (3) To assess how well participants were able to personally identify with the meme, participants were asked: “On a

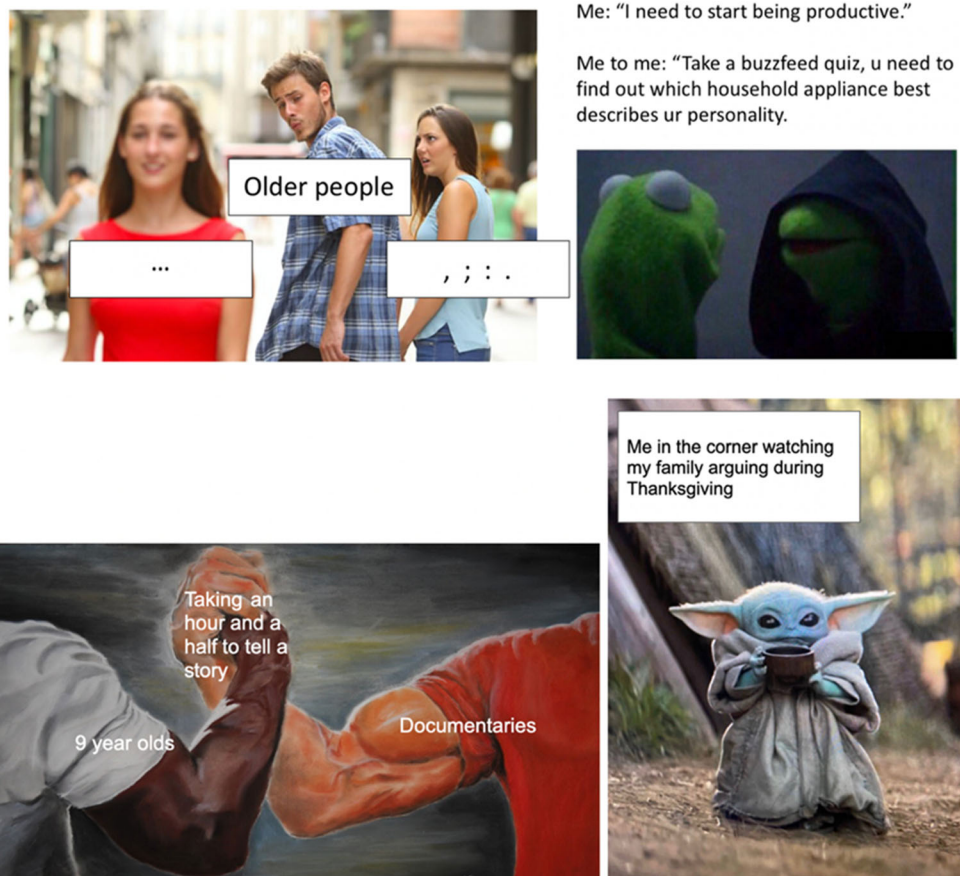


Fig. 1 Variations of the two basic memes used in Study 1A (top row: Distracted Boyfriend and Evil Kermit) and Study 1B (bottom row: Epic Handshake and Baby Yoda). Basic memes here refer to the meme template (i.e., the meme without text)

scale from 1 (not relatable at all) to 8 (very relatable), how relatable did you find this?"

- (4) To assess the goodness of metaphorical fit between the image and its topic, participants were asked: "On a scale from 1 (not apt at all) to 8 (very apt), how aptly does this meme fit its topic?"
- (5) To measure comprehension, participants were asked: "On a scale from 1 (not at all) to 8 (very well), how well did you understand this?"
- (6) To measure the extent to which the meme had an unexpected quality, participants were asked: "On a scale from 1 (not surprising at all) to 8 (very surprising), how surprising were the captions?"

Because we did not wish to bias participants by providing theoretical definitions of terms, we simply asked the questions without providing elaboration. Pilot data indicated that participants found the questions clear. The measure of aptness was similar to that introduced by Tourangeau and Sternberg (1981), who also did not define the term to participants (also Blasko & Connine, 1993; Chiappe et al., 2003; Jones & Estes, 2006; Pierce & Chiappe, 2008).

Procedure Both studies were administered through Qualtrics. Each participant was shown one specific instance of each of the two basic memes (i.e., a total of two images). The instances were randomly sampled for each participant from among the 12 in each of the two sets, with a restriction to ensure that an approximately equal number of participants rated each of the 12 instances of each meme. The presentation order of the two memes was counterbalanced across participants.

Prior to the six main questions for each meme, participants were presented with the basic meme (i.e., the bare template of the image without any text), and asked if they had ever seen the image before (to be answered "yes" or "no"). The same question was then asked for the specific meme (with text). Participants then answered the six rating questions for the specific meme. The same procedure was then repeated for the second meme.

Results

Because Studies 1A and 1B had identical designs and very similar patterns of results, all analyses reported here combined data from both ($N = 200$). Table 1 summarizes the Pearson correlations among all measured variables. The pattern of correlations reveals a strong association between humor and comprehension, as well as strong correlations of each of these variables with aptness and relatability. Both humor and comprehension had weaker but reliable correlations with familiarity; humor only had a small but reliable correlation with

Table 1 Pearson correlations among all measured variables (combined data from Studies 1A and 1B)

	1	2	3	4	5	6
1. Humor	1	.517***	.723***	.701***	.346***	.195***
2. Comprehension		1	.649***	.581***	.456***	-.131**
3. Aptness			1	.690***	.452***	.023
4. Relatability				1	.413***	.059
5. Familiarity					1	-.057
6. Surprise						1

Note: * $p < .05$, ** $p < .01$, *** $p < .001$

surprise. Basic regression analyses revealed that whether a participant had seen either the basic meme template or the specific meme did not reliably predict participants' ratings of comprehension or humor; hence these two variables were omitted in subsequent analyses.

As there were no meaningful zero points for any of the ratings, all variables were mean-centered to improve interpretability of regression results. Structural equation modeling was conducted in R Studio (version 1.2.5) using the R package "lavaan," and regressions were conducted using the package "lme4." Data were clustered by participant to account for the repeated-measures nature of the data (equivalent to the random intercept model); because of the repeated-measures nature of the data, 95% confidence intervals were percentile bootstrapped.

Guided by a priori hypotheses and exploratory regression analyses, we sought to construct a moderated mediation model that could provide a satisfactory overall fit to the rating data. Previous research suggests that the aptness of a metaphor influences its comprehensibility, rather than the other way around (Chiappe et al., 2003). Relatability was constrained to precede aptness, based on the hypothesis that aptness is in part subjective. Humor was always treated as a final dependent measure. Given the hypothesis that humor depends on the resolution of initial perceived incongruity (Suls, 1972), the model also includes an interaction between surprise and aptness as a moderator variable for humor only. Initial regression analyses indicated that familiarity was not a reliable independent predictor of humor, and only a weak predictor of comprehension. We were unable to find a satisfactory overall model that included familiarity, so this variable was excluded.

The resulting model, depicted in Fig. 2, hypothesizes that relatability of a meme influences its perceived aptness, which in turn influences both comprehension and humor. Model fit was evaluated by the following fit indices: chi-squared test (null hypothesis being that the model fits perfectly), Comparative Fit Index (CFI), Tucker Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR). All

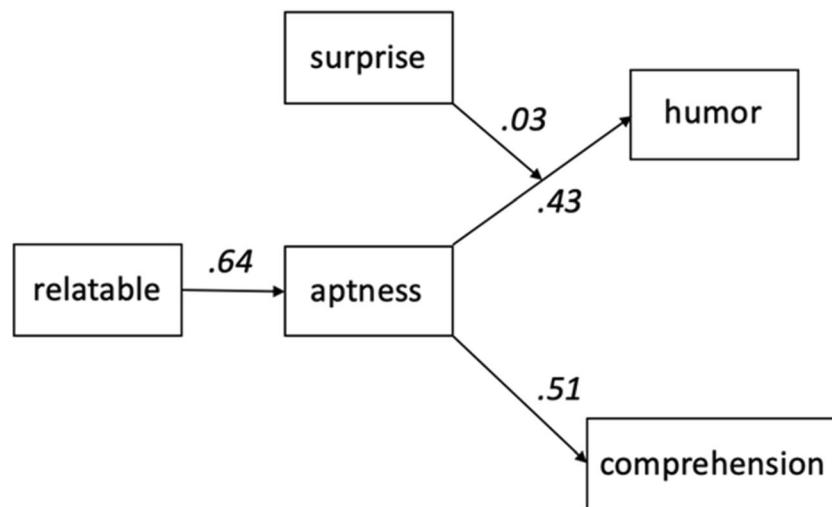


Fig. 2 Best-fitting path model for Study 1A and Study 1B (apolitical memes). All regression coefficients shown are statistically significant

indices (CFI, TLI, RMSEA, and SRMR) range between 0 and 1 (though TLI values can be slightly out of these bounds). Larger values of CFI and TLI, and lower values of RMSEA and SRMR, are indicative of better fit.

All links shown in Fig. 2 were reliable, $p < .001$ in all cases except the moderating link, for which $p = .03$ (0.03, 95% CI: [0.003, 0.054]). Overall, the model's fit was good, $\chi^2(2) = 5.343$, $p = .065$, CFI = .996, TLI = 0.983, RMSEA = 0.065 (90% CI: [0.000, 0.134]), SRMR = .025. The indirect effect of relatability on humor, through aptness, was strongest when the captions were rated as more surprising; this interaction was statistically significant (0.03, 95% CI: [0.003, 0.054]). The indirect effect of relatability on comprehension was also significant (0.327, 95% CI: [0.241, 0.413]). At all levels of surprise as a moderator, the total indirect effect was significant, $ps < .001$. Partial mediation was achieved, as the direct effect of relatability on humor remained statistically significant (0.349, 95% CI: [0.258, 0.441], $p < .001$) after accounting for the indirect effects, as was also the case for comprehension (0.253, 95% CI: [0.146, 0.360], $p < .001$).

Study 2

Study 2 extended the project to memes that were explicitly political in their focus, with participants selected as self-identified American conservatives or liberals. In addition to the appraisals obtained in Studies 1A and 1B, we also assessed participants' propensity to share the memes with others. Propensity to share is directly relevant to the social impact of memes. Pre-registration of Study 2 through the Open Science Framework was initiated on 14 April 2020 and approved on 16 April 2020 (<https://osf.io/jpwhx/>).

Method

Participants Participants were 281 (61% male) Amazon Mechanical Turk workers located in the USA, between the ages of 18 and 76 years ($M = 37.26$, $SD = 11.40$). American conservatives ($N = 133$) and liberals ($N = 148$) were recruited using the MTurk filters for political orientation. Libertarians and independents were not included in this study.

Materials A set of 12 memes were collected from a conservative subreddit (<https://www.reddit.com/r/Conservative/top/?t=all>), and another set of 12 memes were collected from a liberal subreddit (<https://www.reddit.com/r/PoliticalHumor/top/?t=all>). These served as the "conservative" and "liberal" memes, respectively. Memes were selected from each site's most popular posts of all time. Memes were collected in April 2020, and the study was conducted the same month. Figure 3 provides examples. Whereas the memes used in Studies 1A and 1B were selected to be variants of two basic memes, the memes in each set of 12 used in Study 2 were all unique, thus providing increased variety. Consistent with the view that humor typically functions as some sort of "put down" (Gruner, 2000), the majority of these popular memes attacked an opposing view, rather than supporting the favored view. Among the 12 conservative-oriented memes, ten attacked liberal views, one attacked China, and only one directly supported the conservative cause. Among the 12 liberal-oriented memes, eight attacked conservative views and four criticized the US government.

Measures Each participant was presented with two randomly selected memes, one from each set (conservative and liberal). Participants provided Likert-scale ratings for each meme in response to the same six questions used in Studies 1A and

Maybe we should have a marginal Tax rate of 70% on income over \$10 million.

People that make 50k a year:

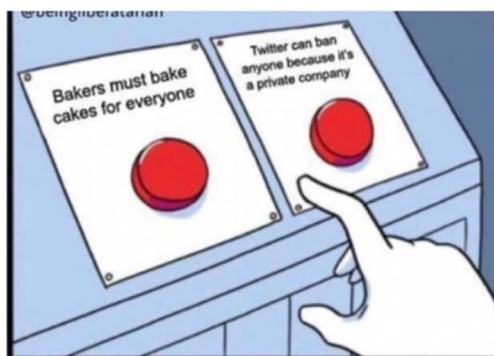


Fig. 3 An example of a liberal-oriented meme (left) and conservative-oriented meme (right)

1B. In Study 2, participants were asked two additional questions after the initial six questions, in the following order:

- (1) To gauge a participant's (dis)agreement with the meme, they were asked: "On a scale from 1 (strongly disagree) to 8 (strongly agree), how much do you agree with the message?"
- (2) To gauge a participant's willingness to share the meme, they were asked: "Is this [meme] something you would share with friends and family (e.g., via social media, text messaging, etc.)?" This question was to be answered yes or no.

Finally, participants were asked to complete the 12-item Social and Economics Conservatism Scale (SECS) (Everett, 2013). Participants were also asked to provide their self-described political orientation, with the following response options: Extremely Conservative, Moderately Conservative, Moderately Liberal, and Extremely Liberal.

Procedure Each participant was shown one specific instance of each of the two sets of political memes (i.e., a total of two images). The instances were randomly sampled for each participant from among the 12 in each of the two sets, with a restriction to ensure that an approximately equal number of participants rated each of the 12 instances of each meme set. The presentation order of the two memes was counterbalanced across participants.

Participants then answered the six core questions for the first meme followed by the two additional questions. The same procedure was then repeated for the second meme. Lastly, participants responded to the 12-item SECS (Everett, 2013).

Results

All participants were coded as either politically conservative or liberal (binary variable). Mean score on the SECS scale (range 0–100) was 74.13 for conservatives and 43.52 for liberals. The congruity of each meme was also coded as a binary variable ("1" for conservatively oriented memes viewed by conservatives, and liberal-oriented memes viewed by liberals; "0" otherwise).

Table 2 summarizes the Pearson correlations among all measured variables. The pattern of correlations reveals strong associations among propensity to share memes and rated humor and comprehension, as well as strong correlations of each of these variables with aptness and relatability, and weaker but reliable correlations with familiarity. Sharing and humor, but not comprehension, also had a small but reliable correlation with surprise.

Using the same methods as in Study 1, we sought to construct a moderated mediation model that could provide a satisfactory overall fit to the rating data. The most successful model is depicted in Fig. 4. This model was constrained to

Table 2 Pearson correlations among all measured variables (Study 2)

	1	2	3	4	5	6	7	8	9
1. Share	1	.669***	.379***	.642***	.162***	.577***	.642***	.376***	.231***
2. Humor		1	.469***	.724***	.173***	.730***	.753***	.359***	.220***
3. Comprehension			1	.481***	.052	.590***	.530***	.355***	-.041
4. Agreement				1	.222***	.750***	.769***	.358***	.118**
5. Congruity					1	.141***	.187***	.085*	-.037
6. Aptness						1	.773***	.409***	.087*
7. Relatability							1	.464***	.170***
8. Familiarity								1	.197***
9. Surprise									1

Note: * $p < .05$, ** $p < .01$, *** $p < .001$

incorporate all pathways from the comparable model for Study 1 (Fig. 2), augmented by additional pathways to incorporate the new variables examined in Study 2. We hypothesized that individuals would agree more with congruent memes than incongruent ones, leading to greater relatability, which in turn influences perceived aptness. The model also reflects the hypotheses that memes that are viewed as comprehensible and humorous will be most likely to be shared with others.

Overall, the fit of the model presented in Fig. 4 was good, $\chi^2(5) = 5.31, p = .379$, CFI = 1.00, TLI = 0.999, RMSEA = 0.011 (90% CI: [0.000, 0.060]), SRMR = .001. The indirect effect of congruity on sharing propensity, through humor, was statistically significant (0.017, 95% CI: [0.008, 0.026]), conditioning on the average value of surprise as a moderator. Qualitatively, this indirect effect became stronger as captions were rated as more surprising. However, the coefficient for the moderating effect of surprise on humor (via aptness) was slightly smaller than that estimated for Study 1, and fell short of statistical significance (0.021, 95% CI: [-0.007, 0.049]). The second indirect effect of congruity on sharing propensity,

through comprehension, was statistically significant (0.009, 95% CI: [0.001, 0.017]). The total indirect effects at each level of the moderator were significant, $ps < .001$. Complete mediation was achieved, as the direct effect of congruity on sharing propensity was not significant after accounting for the indirect effects (0.098, 95% CI: [-0.060, 0.255]).

Guided by the path model depicted in Fig. 4, we can trace the indirect influences of meme congruity on propensity to share in greater detail. Although a larger proportion of congruent than incongruent memes were shared (.45 of congruent memes vs. .29 of incongruent memes, odds ratio = 2.48, $p < .001$), the proportion shared was nontrivial even for incongruent memes (for both liberal and conservative participants). Each participant saw one congruent and one incongruent meme and could elect to share both, either, or neither; hence the proportion of participants who elected to share the incongruent meme was also .29. Rated aptness, the main immediate driver of comprehension and humor, was higher for congruent than incongruent memes (means of 5.24 vs. 4.60, $t(280) = 4.11, p < .001$). Congruent memes were also rated as more humorous (4.72 vs. 3.90, $t(280) = 5.19, p < .001$). However,

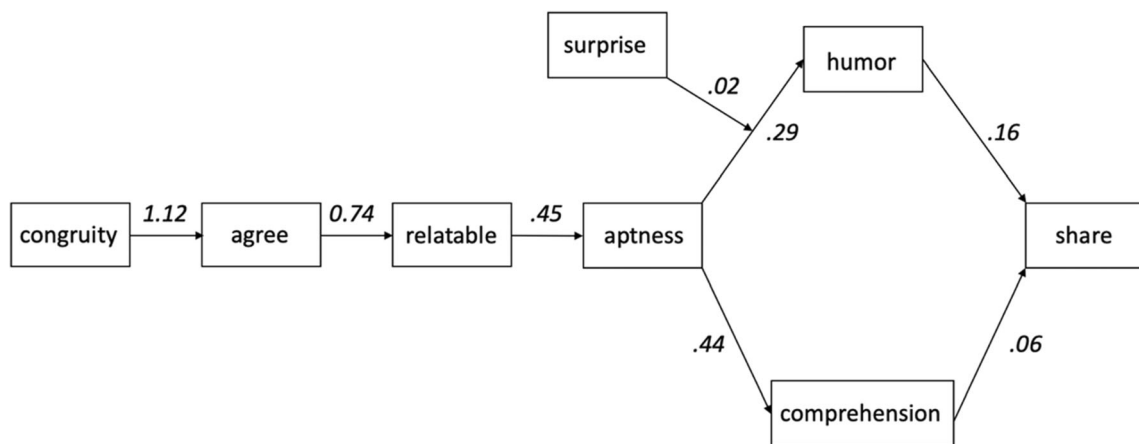


Fig. 4 Best-fitting path model for Study 2 (political memes). All regression coefficients shown are statistically significant, except for the moderating link from surprise

ratings of comprehensibility did not reliably differ between congruent and incongruent memes (6.23 vs. 5.99, $t(280) = 1.39$, $p = .164$). Thus, people could generally understand memes incongruent with their political position, but found them less funny than congruent memes.

We also examined the differences in humor and comprehensibility between shared and unshared memes. Memes selected to share were rated as much more humorous than those not selected (6.37 vs. 3.10, $t(280) = 20.68$, $p < .001$), and also more comprehensible (7.27 vs. 5.44, $t(280) = 9.61$, $p < .001$). This pattern was not reliably different for congruent versus incongruent memes. Thus, while people generally found congruent memes more humorous than incongruent ones, they were willing to share an incongruent meme that struck them as especially humorous as well as comprehensible.

A number of alternative models that varied the structure of the new variables added in Study 2, while maintaining the structure of the variables established for Study 1 (Fig. 2), were also examined. These alternative models included: (1) linking comprehension to humor, (2) removing the node for agreement, and (3) dropping the link from comprehension to share. These models either produced significant chi-square test results, worse comparative fit (CFI and TLI), or greater error (RMSEA and SRMR) relative to the model in Fig. 4.

General discussion

In two studies, each using different memes, we investigated cognitive and motivational factors that predict the comprehensibility and humor of internet memes, as well as (in Study 2) the propensity to share them with friends and family. Overall, our findings support the hypothesis that memes are best viewed as a variety of metaphor (Huntington, 2013, 2015; Milner, 2016; Piata, 2016; Shifman, 2013). Unlike verbal metaphors examined in previous studies of metaphor, which have generally been produced by either psycholinguists or elite writers, memes more clearly constitute creative products of ordinary people. Structural equation modeling established that the most potent and robust direct predictor of both comprehensibility and humor was the rated aptness of the meme – the participant's sense of how well the source image matched and informed the target topic cued by the verbal caption. Although aptness was correlated with familiarity of the meme, the latter factor had little predictive power after accounting for aptness. These findings parallel evidence from studies of metaphor comprehension, which have also identified aptness as a particularly central predictor of metaphor appreciation (Chiappe et al., 2003; Jones & Estes, 2006). A plausible hypothesis is that apt memes, like apt metaphors, are more likely to be propagated and hence become familiar.

The present findings go beyond previous studies of metaphor comprehension in linking aptness not only to

comprehension of memes, but also to their perceived humor. Consistent with theoretical analyses of humor, which have often emphasized the importance of surprise or incongruity (Koestler, 1964; Ruch, 2008; Suls, 1972), the impact of aptness was to some extent moderated by the degree to which the meme was viewed as surprising. Moreover, aptness and its consequences were subject to the influence of pragmatic and motivational factors. In work on metaphor, aptness is often treated as an objective characteristic of a metaphor; but at least for memes, perceived aptness has a subjective component. In particular, structural equation modeling in the current study revealed that rated relatability – the degree to which the participant personally identified with the message conveyed by the meme – influenced its perceived aptness. To some extent, aptness is indeed in the eye of the beholder. The present findings are consistent with previous work showing that greater political agreement with a meme is accompanied by less skepticism and more favorable ratings of argument quality (Huntington, 2020).

The impact of pragmatic and motivational factors was particularly salient when we examined how political memes were perceived by self-identified conservative and liberal participants (Study 2). The perception of polarized memes was heavily influenced by their congruity with the political views of the participant (where conservative-oriented memes viewed by conservatives and liberal-oriented memes viewed by liberals were considered congruent, and memes supporting the opposing view were considered incongruent). The most successful structural equation model for Study 2 (Fig. 4) included all the same paths as those identified in Study 1 for apolitical memes (Fig. 2). In addition, for political memes we found that congruity of the meme operates via a link to agreement with its message, to its relatability, to its aptness, thereby influencing both comprehension and humor, which in turn influence propensity to share the meme with friends and family.

Not surprisingly, people were more likely to elect to share congruent than incongruent memes; however, the impact of congruity on sharing was nuanced and indirect. For both conservatives and liberals, only about half of the congruent memes were selected for sharing, whereas about a quarter of incongruent memes were also selected. These findings are consistent with those of a study by Guadagno, Rempala, Murphy, and Okdie (2013), in which participants were more willing to share an anger-inducing video sourced from an out-group member, with this relationship being mediated by interest. Guadagno et al. speculated that this effect may have been driven by participants' motive to disparage a rival, as suggested by earlier evidence that political bloggers share incongruent content for that reason (Wallsten, 2010). A similar explanation may at least in part explain the sharing of incongruent memes as observed in the present study.

The major factors differentiating shared from unshared memes were their rated humor and comprehensibility;

complete mediation was achieved, in that the direct effect of congruity on sharing propensity was not significant after accounting for its indirect effects. Unlike metaphors or analogies intended to persuade adversaries, memes may primarily act as devices for building social coherence (Gal et al., 2016). They are intended to generate humor shared by those who already agree with the view being expressed, often at the expense of those who would disagree (Gruner, 2000). Particularly in this era of political polarization, it is perhaps comforting that congruity is not the sole or direct determinant of the propensity to share memes and thus promote their virality. We found that a substantial proportion of both liberals and conservatives appeared able to appreciate an incongruent meme that successfully pokes fun at their own political beliefs. If a meme is funny enough (even at one's own expense), it may be worth passing along to others.

The present study has several limitations that should be addressed in future research. In particular, self-reported anticipation of sharing memes (Study 2) is not the same as actually sharing. It would be desirable to examine whether the models developed in the present paper can be used to predict naturalistic sharing of memes. In addition, sharing of memes may depend on individual differences in propensity to share memes – indeed, many social media users may not share memes at all. Propensity to share may depend on generational factors, as well as on personality variables (e.g., extraversion). In addition, memes differ in their format (e.g., whether text is incorporated into an image), and such variations may influence their impact. There is clearly much that remains to be learned about the factors that influence how memes influence viewers and motivate their own transmission.

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