

Structured equation model of antecedents to performative action from social media exchanges

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Abstract—Beyond communicating, social media are used in performative actions ranging from targeted marketing to target designation in what is referred to as opensource intelligence. The literature has extensively covered cyber behaviors as people interact with social media. This body of research has established that social media influences people in different ways, but which people and under what conditions? The answers remain unclear. We used an unsupervised machine learning method to identify clusters of people’s attributes for those who may be inclined to escalate their actions based on social media conversations. We then used structured equation modeling of participant responses to a questionnaire and observed their actions to triangulate our findings and validate them. Our purpose was to determine if the theoretically determined constructs were observed empirically; that is, to develop and test the theoretical model of the antecedents to determine their predictability of action outcomes.

Keywords—*performative action, social media, cyber behavior*

I. INTRODUCTION

Social media in its many varieties has been both lauded and criticized for its ability to disseminate information in various forms and forums. Both the press and the body of academic literature have focused on deleterious effects from social media, including the misuse of “memes” [1], the use of AI-generated deep fakes, and deployment of fake news, along with other forms of expression that are designed to misdirect or to disseminate misinformation or disinformation [2]. However, some consider social media and the movements they may inspire, efficient and constructive ways to mobilize like-minded people toward causes with good intentions [3]. We take a value neutral position.

The body of cyber-behavior literature has provided a rich background of conceptual and theoretical work, including the development of scales to measure various aspects of perceptions and actions stemming from social media conversations, and new methods including the use of machine learning [4]. However, a cohesive theoretical framework for explaining antecedents in escalatory actions is still needed to further guide the literature toward consolidation [5]. This is important for the phenomena to be properly studied in a field setting, in which it is necessary to have theoretically defined constructs. Since a cohesive theoretical framework has yet to emerge to help consolidate the literature, foundational models are needed [6]. To mitigate this gap, we used a randomized survey of participants in a company online discussion about salary and promotion changes. The

important questions to us were, how do these social media conversations influence people’s actions, and who are most likely to take part in these actions. These sections follow.

II. AFFECT INTENSITY AND PERFORMATIVE ACTION DEPENDENT VARIABLES

The literature has shown consistent relationships among people’s characteristics and their reactions to conversations in social media. Nevertheless, these reactions have differed among populations, and according to different personal characteristics in specific contexts [7]. What has been clear from the literature is that social media have been sources of inciting and organizing activism with increasing degrees of violence and destruction. At a minimum, social media have been linked to people’s psychological well-being, which may act as a moderator to subsequent feelings and actions [8]. For instance, people who were informed through social media that the COVID virus affected senses such as taste, expressed greater fear about becoming ill during the pandemic and reported feeling more disgusted by certain innocuous smells or combinations of tastes than those who were not informed of this rare effect [9], indicating that these psychological states exhibited physiological manifestations. Given these conditions, it is important to note that recent political developments have highlighted the impacts of social media influences on activism or hactivism; however, the causes for this activism are not solely in the domain of the military or political arena. The outcomes are important to commercial organizations as well, particularly since social media are increasingly part of most corporate ecosystems [10].

Two general effects have been reliably reported in the literature, first; that social media may intensify feelings, particularly if those feelings involve confirmation biases, and second; social media may act as an action catalyst for some people depending on their personal characteristics [11]. Consequently, the dependent variables of interest in our study were (a) affect intensity, and (b) performative action. Affect intensity reflects how strongly one feels about a subject or object. Performative action has been defined as both language and behaviors involved in social action designed to effect change [12]. Austin [13] referred to “performativity” as the capacity of speech and communications to cause actions (performative actions). This has been distinguished from opinion seeking or advice giving in that it is seen as an ignition

source or catalyst for action, rather than simply an exchange of ideas – known as informative actions.

III. THEORY AND HYPOTHESES

Research that has developed theoretical frameworks for cyber behaviors from social media exchanges [14] have tended to rely on theories *a priori*, such as the theory of planned behavior. We used unsupervised machine learning with Spectral Clustering to mathematically identify clusters of cases, which were then empirically classified and logically warranted in the hypotheses. The prose sentiment in the blogs were analyzed using natural language processing and sentiment analysis. We elaborate on this approach in the Method section. The following hypotheses represent those clusters.

A. Idealism/Pragmatism

Idealism is a global, holistic, and strategic view towards life events; whereas pragmatism is a local, segmented, and tactical view. Idealistic people tend to act based on valued principles which leads them to make value-driven decisions, whereas pragmatic people tend to be more utilitarian in their thinking and transactional in their formal interactions. They generally hold the view that one's values are applied to the practical application of action along with considering their immediate consequences, and they are typically focused on the issues, as opposed to principles [15]. Moreover, studies [16] have shown, for example, that people who are more idealistic tend to have greater desires to comply with significant others' implicit and explicit views about a thing or a given behavior, and thus tend to be more mobilized by social media messaging. As a result, those who are highly idealistic are sensitive to subjective norms expressed in social media because they feel inspired by collective effort, and they seek approval from significant or prominent others' implicit or explicit views than those who are less idealistic. As social influences increase toward the extremes, idealistic people strive increasingly to act according to social cues and the normative pressures that coincide with their deeply held values and ideals [17]. Thus, idealistic people are typically more inclined to take actions for, or against, causes in which they believe, or run contrary to, the ideals they value in greater proportion to those who are more pragmatic in nature. Thus, we hypothesize:

H1a-b: Those who are more idealistic will be more likely (1) reflect higher affect, and (2) take greater action, based on social media posts compared to those who are more pragmatic.

B. Optimism/Pessimism

People have predisposed expectancies about life events where some have negative outlooks (pessimism), others are more positive (optimism) [15]. While these tendencies are neither static nor dichotomous, they do reveal behavioral regularities. For example, studies [18] have shown that company employees who score high in pessimism on psycho-social instruments often assume that new company announcements will result in bad news, as opposed to those who score high on optimism in these same measurements who tend to think company announcements will be good news. The body of research has demonstrated that optimistic people tend to be more proactive than those who are pessimistic. For example, there is evidence that people who are more optimistic than pessimistic

are likely to engage in pro-social activities, and they are more persuadable by social media commentary [19]. Also, highly optimistic people typically take proactive actions based on their assessments of the pros and cons of an issue and concomitant actions in greater proportion to those who are more pessimistic, who tend to be more reactive when issues arise [8]. Therefore, our hypothesis is,

H2a-b: People who are more optimistic will (1) reflect higher affect, and (2) take greater action, based on social media posts than those who are more pessimistic.

C. Extroversion/Introversion

When considering a problem or an issue, some people are more self-reflective and self-reliant in terms of these cognitive processes, known as internally focused or introverts, compared to others who tend to rely on group interaction, known as externally focused or extroverts [20]. The effects of these cognitive processes can be observed in the differences between people who need quiet solitude and concentration for ideational generation, and those who find group processes such as group brainstorming a means of cognitively priming ideas. Studies [21] have also found that extroverts tend to seek information and ask questions of others in greater proportion to those who are introverts. Introverts tend to rely on their own opinions when making decisions. As a result, introverts approach their actions in an introspective and deliberative fashion, and they prefer to work alone on tasks. They use an internal source for their cognitive priming and ideational generation, and they prefer individual-focused decision-making and action taking. Extroverts are more expressive. They prefer collaboration and information sharing for generating ideas and determining solutions to problems as they evolve through cooperative interaction, which serves to reinforce their action taking [22], consequently we hypothesize that,

H3a-b People who are more extroverted will (1) reflect higher affect, and (2) take greater action, based on social media posts than those who are more introverted.

D. Internal/External Locus of Control

Locus of control is the extent to which individuals perceive they have control over life events. Internal locus of control are people who perceive that outcomes are largely the result of individual actions, whereas externals generally perceive events to be beyond their control [23]. There is variability among people along the internal-external continuum because experience provides a sense of control based on the reinforcement individuals receive under certain conditions. When individuals perceive that they have control over outcomes, they tend to believe that they control their own destinies and will accept responsibility and subsequently will take action in greater proportion compared to those who feel that outcomes are out of their control. When people feel that outcomes are controlled by fate or powerful others, they tend to shift responsibility for their actions to others (Harrington, 1996). We often see this behavior in the concept of social loafing [24]. Also, denial or acceptance of responsibility is thus a product of rationalizations, which are based in part on one's perceptions of control. As an example, high external locus of control has been associated with a heightened variety of counterproductive behaviors [23]. With respect to social media influences, people

who have high perceptions of internal control tend to be more proactive in taking precautionary measures and taking actions, such as vetting information they read when compared to those who have low, or external locus of control [25]. As a consequence, we hypothesize that,

H4a-b People who have high internal locus of control will (1) reflect higher affect, and (2) take greater action, based on social media posts than those who are more external in locus of control.

E. Perceived Vulnerability or Impact

The literature uses different terms to refer to the same or similar concepts involving one's susceptibility to social media influences. While some of the literature incorporates this under the social influence construct [26] and others under subjective norm [27], most of the literature defines this as either perceived vulnerability, or perceived impact, when describing one's evaluation of the likelihood that he or she would be negatively or positively affected by a thing, event, or commentary presented in social media. It indicates how much influence they feel that social media subject matter exerts upon them. Unlike locus of control, rather than perceptions about the ability to influence, in this context, perceived vulnerability or impact indicates how susceptible people feel to social media influences. Generally speaking, people consider at least two utilities upon evaluating actions and outcomes. First, they assess whether they are impacted directly or indirectly by both the event that would initiate actions, and the consequences of taking or not taking actions [28]. If people feel that they are vulnerable to or impacted by an event expressed in social media, either directly or to a lesser extent indirectly, they weigh the costs versus benefits of taking an action versus not taking any action. That is, they take actions depending on how consequential or beneficial they consider one course versus the other.

When people assess that social media subject matter is likely to impact some aspect of their lives, such as impeding or enhancing their values, goals or plans, this raises their intentions to take some form of action such as either trying to get a post or video removed from a forum, or to share and promote it with others [29]. This is an attempt to manipulate or shape opinions of others to align with and gain support for one's own interests. In so doing, these manipulations are filtered and distorted, and propagate rapidly through a variety of social mediums. However, it is important to note that there is variability among people in how impactful social media are, both in terms of observed and perceived effects [2]. For instance, some people view social media as a conduit for inciting or causing actions such as political riots, while others see social media as simply a sounding board or a reflection of what is already extant in society [30]. Moreover, studies [31] have found that participants who stated that social media were very influential to them were less likely to notice deep fake videos than participants who said they did not find social media to be very influential to them. Thus, we hypothesize,

H5a-b People who have high perceptions of vulnerability (impact) from social media will (1) reflect higher affect, and (2) take greater action, based on social media posts than those who have lower perceptions of vulnerability (impact).

F. Perceived Self-Efficacy

Self-efficacy has been situated in the cyber behavior literature as computer self-efficacy. Self-efficacy in this context generally refers to one's beliefs in having functional working knowledge and skills to both use and control certain social media parameters, such as privacy [28]. Global populations have become more computer literate, but the issue of maintaining privacy and security has elevated people's attention to social media threat surfaces and vectors, hence the majority of the literature has focused more on this latter aspect [31]. People must believe in their ability to successfully perform tasks such as limiting exposure levels, using proxies, virtual private networks, multifactor authentication, account pseudonyms, tying accounts to burner phones and junk mail accounts, and so forth. However, people are still at the mercy of the technology providers in terms of data collection and dissemination.

Bandura [32] described two classes of expectations: outcome and efficacy. Outcome expectations are one's probability estimates that a behavior will lead to some outcome. An efficacy expectation is the person's estimate that he or she can perform a behavior required for some outcome. Although some research has shown generational differences, as a rule, people who have low self-efficacy tend to acquiesce to these risks, or accede their concerns to the "experts" who are "in charge" of the technologies, whereas those with higher self-efficacy (in addition to taking additional precautions) tend to be more vocal and active when it comes to resisting both information distribution by vendors and intermediaries, as well as to take some form of action against violators or disseminators of fake information in social media [33]. We hypothesize that,

H5a-b People who have greater perceptions of self-efficacy will (1) reflect higher affect, and (2) take greater action, based on social media posts than those who have lower perceptions of self-efficacy.

IV. METHOD

A. Sample

We studied a large global financial services corporation based on the east coast of the United States, who wanted to undertake a comprehensive pay and benefits restructuring including dropping merit raises and replacing them with a graduated bonus program. For the employees, the main advantage of the merit raise included gradual salary increases over time, the main advantage of the bonus program was that one could receive significantly more money in a single year compared to a merit increase, but it was not guaranteed year to year, and his/her base salary would remain constant. According to human resources (HR), this prospect was considered highly controversial and likely to ignite strong feelings one way or the other. After receiving IRB approval, our entrée into the organization was facilitated by the company. They wanted to determine employee sentiments about the pay changes and identify concerns using a controlled blog. The research team was brought in to provide guidance to the HR department and to conduct the study. The organization sample was drawn from all of the corporate office populations in the United States, Canada, Ireland, the UK, and France. There were 753 participants who completed the questionnaire, and 4518 blog posts, which ranged

from a participant minimum of 2 posts to a maximum of 13. The HR department indicated that the associate pool was 1124 people giving us a 67% response rate, response rate and a +/- 3.5% sampling confidence with a standard error of estimate of 0.05. Of the 753 participants, 487 of were males, 276 were females, and their ages ranged from 23 to 61 ($\mu = 37$). All participants had a minimum of a high-school education, 316 had a baccalaureate degree, 91 had a master's degree, and 19 held doctorates ($\mu = 2.27$, $\sigma = 1.02$). The participants were matched with confidential User IDs collected from postings in a company blog that was setup both to collect feedback and for the purposes of our study. No other identifying information was disclosed for privacy reasons.

B. Instrumentation

We gathered our data using natural language processing, sentiment analysis, and unsupervised machine learning to mathematically identify clusters of attributes. Natural language processing (NLP) automatically scanned blog comments and built sentiment trees, which were then reproduced on a natural scale. For the clustering algorithm, we chose Spectral Clustering over K-Means because it is more appropriate for small to medium sized samples. Although the clustering allowed the factor constructs to be discovered mathematically, these are not theoretically defined and thus require examination followed by logical explanation and warranted justifications as hypotheses. In short, where supervised machine learning begins with labeled hypotheses using train and test datasets, unsupervised machine learning has no predefined labels or concepts. Instead, the train data are used to discover vectors that have no corresponding target values, and thus unsupervised learning determines and clusters groups of similar cases where no preexisting structures or relationships are known to exist. Consequently, with non-parameterized unsupervised learning, groupings emerge according to the mathematical or semantic distance of the components within and among categories found in the data. One key benefit (besides automation) is that one does not need to make assumptions about the observed population a priori. With Spectral Clustering, an affinity matrix is embedded between samples, followed by clustering of the components using the eigenvectors in low dimensional space, similar to the process used by latent semantic analysis but with greater maintenance of semantic context in the relationships. Once these categories are identified, along with their accompanying relationships, the theoretical justifications are developed from those structures and relationships, which are then articulated as hypotheses. These hypotheses then form the theoretical backbone of the remainder of the analysis.

After these data were analyzed and categorized, we had participants complete a questionnaire for this study to develop a theoretical model of our findings, and to further validate this model using structured equation modeling (SEM). This is a good approach when the theory is highly relevant to real-world events and the researchers want to be able to generalize their findings to world of practice. The questionnaire was necessary for the development of logical justifications (i.e., face validity) of the hypotheses, and to indicate the validity and reliability measures of responses for the model. The constructs in the questionnaire were measured with previously validated scales, applied to this study.

C. Procedures

First, participants watched a mandatory 25–30 minute online factual presentation explaining the proposed compensation program, after which they took a short quiz to ensure that they had viewed the presentation. If participants scored less than 80%, they were required to repeat the presentation. Next, they produced a blog where participants would post confidential comments, which were advertised by the company as for the purposes of helping them to come to a decision. To maximize participation in the social media blog, associates were regularly prompted to participate and were given 'purchase points' for doing so, which could be applied to making purchases from affiliate merchants, such as Macy's gift cards, discounts at restaurants, and for merchandise such as cooking utensils. Participants were also notified when someone viewed or commented on their post to get them to reengage. For example, bot-generated prompts and cues were used to get participants to read the social media commentary, such as generating notifications that stated: 'Hey, someone just viewed/commented on your posting.' After three months, the blog was 'locked' such that no more posts were allowed. Participants were notified of the 3-month time limit at the beginning of the study, with reminders of remaining time to respond each week. This was to get them to stay engaged before time ran out. When comments were made in the blog, the commenter's User ID was logged so that we could tie blog posts (and subsequent actions) to a User ID. The User ID was also the identifier for the questionnaire so that we could connect all of the actors with their responses. User IDs are a combination of letters and numbers (e.g., Xyz123) whose associated employee names were known only to HR. The company provided us the User IDs. Three modes of action were created and then observed, as follows:

(1) Action mode 1 – Sign A Petition (least effort) involved two online petitions available from the webpage tied to the blog. The petition could be signed by pressing a 'for' or 'against' button, which recorded the User ID and prevented more than one 'signature' per associate. The buttons were activated and participants were told of this petition at the conclusion of the blog postings.

(2) Action mode 2 – Comment. Memo (medium effort) consisted of a 'Hot Line' button that was associated with the blog in which participants could 'write a more formal comment' to HR. If a participant selected this option, they would select a title, select a 'For' or 'Against' radio button, enter their names into a textbox, and write a short message to HR to voice their support or complaint. The participant could check a box in the message to make it hide their name and show only their User ID, or unchecked it rendered their name. We allowed the option to reveal their names because some wished to do so, and we wished to see if it correlated with affect intensity. Moreover, in this mode, as with the other modes, we specifically wanted to capture whether the comment was positive or negative in sentiment so that we could later determine in our analysis whether there was a difference between positive and negative sentiment relative to affect intensity.

(3) Action mode 3 – Attend Rally (high effort) involved attending a 'rally' meeting, one was for the change, and the other was against it. Participants would sign in with their User IDs at

the conference room entrance where their chosen rally was to be held. The rally meetings were held the same day and time, but at two different locations to avoid contamination. Employees who were working in remote locations could attend one of the meetings via Webinar with User ID sign in. If participants took more than one action, their score was removed from the lower mode action and they were scored as their highest action. If a participant engaged in all three modes, their scores were removed from the other mode scores, and were scored at the polar end of effort. This formative scale (used as the dependent variable), along with the independent variable scales, were used in our analysis (explained in the Results section).

D. Data Collection and Validation

The data were collected with two techniques: (1) direct observations (objective measures) of behavioral responses denoted by the observed actions taken (e.g., messaging HR, attendance at Rally), and (2) the online questionnaire (subjective measures) using pre- and post-validated scales. Where subjective measures assess perceptions of overall general behaviors people attribute to themselves (they are nomothetic), objective measures sample those perceptions in practice (they are ideographic). Scales and validation are shown in Table 1.

TABLE 1. LOADINGS, WEIGHTS, T-VALUES, AND RELIABILITIES

Item Code	Item Table		
	<i>IDEALISM / PRAGMATISM (I/P)</i> $\mu = 4.46, \sigma = 1.42, \alpha = 0.93$	Load	t-Stat
I/P 01	I engage in actions that further my principles	0.89	41.44
I/P 02	I actively support causes that result in immediate rewards (rev)	0.86	37.21
I/P 03	I take up the causes of people who share my values	0.92	59.66
I/P 04	I actively support causes that match my values	0.91	39.94
I/P 05	When making decisions I focus on the consequences for myself first (rev)	0.95	18.73
Item Code	<i>OPTIMISM / PESSIMISM (O/P)</i> $\mu = 3.92, \sigma = 1.02, \alpha = 0.87$	Load	t-Stat
O/P 01	I believe the future will be better than the past	0.86	19.88
O/P 02	Every problem has a solution	0.79	18.76
O/P 03	In general, things go well in my life	0.97	14.21
O/P 04	I expect to have many problems in my life (rev)	0.78	12.33
O/P 05	Life is going to get better	0.74	10.54
O/P 06	Problems create opportunities	0.62	8.58
Item Code	<i>EXTROVERT / INTROVERT (E/I)</i> $\mu = 3.99, \sigma = 1.70, \alpha = 0.88$	Load	t-Stat
E/I 01	I enjoy talking with people I don't know well	0.98	50.66
E/I 02	I like to go to social events	0.94	40.94
E/I 03	My public image is important to me	0.89	23.11
E/I 04	I am happiest when I am by myself (rev)	0.78	11.01
E/I 05	When making decisions I focus on the consequences for myself first (rev)	0.98	50.66

Item Code	<i>LOCUS OF CONTROL (L/C)</i> $\mu = 4.01, \sigma = 1.34, \alpha = 0.90$	Load	t-Stat
L/C 01	I expect things to turn out as they are destined to be (rev)	0.85	42.61
L/C 02	I control what happens to me	0.87	37.57
L/C 03	I have no control over what happens to me (rev)	0.81	35.79
L/C 04	My life is determined by my choices	0.71	24.32
Item Code	<i>VULNERABILITY / IMPACT (P/V)</i> $\mu = 3.83, \sigma = 0.94, \alpha = 0.92$	Load	t-Stat
P/V 01	I take action if something posted in social media upsets me	0.83	28.32
P/V 02	Materials posted in social media have a large impact on my life	0.82	20.19
P/V 03	The material posted in social media have a lot of credibility with me	0.80	19.37
P/V 04	Materials posted in social media have little impact on my life (rev)	0.78	17.79
P/V 05	I will take action if something in social media pleases me	0.72	16.53
Item Code	<i>SELF-EFFICACY (P/S)</i> $\mu = 4.13, \sigma = 1.25, \alpha = 0.82$	Load	t-Stat
P/S 01	I have the skills to keep my data private in social media	0.92	44.77
P/S 02	I have the ability to use social media in helpful ways	0.83	33.64
P/S 03	I have the ability to take action to deal with threats from social media	0.71	18.08
Item Code	<i>AFFECT (AF)</i> $\mu = 4.22, \sigma = 1.33, \alpha = 0.88$	Load	t-Stat
AF 01	I take things people write to me very personally	0.90	52.56
AF 02	Social media conversations often upset me	0.76	48.23
AF 03	I enjoy engaging in social media conversations	0.62	27.80
Item Code	<i>OBSERVED ACTIONS</i>	Load	t-Stat
BLOG	Sentiment postings petition	0.54	20.77
PROT	Message protest with comments	0.49	18.02
RALL	Attendance at rally	0.23	6.44

Along with objective dependent measures, we tested the hypotheses using the subjective measures as latent variables to allow for a fuller analysis than would be possible using only the subjective or objective measures alone. Since the objective measures are formative and the subjective measures are reflective, there would be no reason to combine them since the entire construct would then become formative. By keeping them separate, we were able to check the measurement properties using traditional validation methods, and consequently, we kept the objective and subjective measures separate to test each set of criterion variables.

Note that there is good correspondence of perceived and observed outcomes, with predictors showing significant relationships with their outcome measures as hypothesized. To determine the convergent and discriminant validity of the items, we ran a Varimax Principal Components Analysis to test the second order model. Those that cleanly loaded are shown in Table 2.

TABLE II. FACTOR ANALYSIS OF SECOND ORDER MODEL

Item	Factor 1	Factor 2	Item	Factor 1	Factor 2
L/C 02	.09	.87	P/S 01	.06	.90
L/C 01	.10	.80	P/S 02	.27	.84
L/C 03	.12	.79	O/P 03	.72	.03
P/V 05	.15	.71	I/P 02	.29	.71
L/C 04	.80	.13	I/P 03	.63	.23
P/V 04	.73	.19	P/S 03	.30	.68
P/V 03	.73	.20	O/P 01	.81	.06
E/I 04	.76	.22	O/P 05	.82	-.12
P/V 02	.69	.30	I/P 05	.74	.14
E/I 01	.28	.68	I/P 01	.36	.79
P/V 01	.13	.63	I/P 04	.32	.73
E/I 02	.20	.61	O/P 04	-.06	.58
E/I 03	.54	.21	O/P 02	.35	.59

*Note: Extraction Method: Principal Component Analysis. Rotation Method: Varimax.

V. RESULTS

A. Measurement and Structural Models

For testing the hypotheses and their direct effects on the dependent measures, we used a partial least squares (PLS) analysis. This allowed us to test the measurement properties of the instrument while simultaneously testing the path coefficients, and as a result, we tested each of the hypotheses against the dependent variables used in the model. The tests for convergent and discriminant validity are seen in the matrix table (Table 3). The table also shows along the diagonal, the average variance explained (AVE) for each of the IVs, and the inter-correlations between constructs.

TABLE III. LATENT VARIABLE AVEs (SQUARE ROOTS OF AVEs) AND CORRELATIONS

Constr.	Ideal. Prag.	Optim. Pessim.	Int. Ext.	Locus Cont.	Vul. Imp.	Self-Eff.
Ideal. Prag.	0.82 (.91)					
Optim. Pessim.	0.55	0.77 (.89)				
Int. Ext.	0.52	0.61	0.82 (.87)			
Locus Cont.	0.46	0.47	0.44	0.85 (.88)		
Vul. Imp.	0.40	0.38	0.31	0.59	0.59 (.81)	
Self-Eff.	0.49	0.41	0.43	0.50	0.36	0.72 (.80)

We can be confident in convergent validity when the AVEs are >.50. We can assume sufficient discriminant validity when the square root of each AVE is higher than its correlation with any other construct in its row or column. As seen, the case for convergent and discriminant validity were adequately demonstrated, and therefore, we concluded that the instrument

exhibited acceptable psychometric properties. The final test of construct validity is seen where all the reflective items loaded significantly ($p < .05$) on the latent constructs. We note that the composite reliabilities are also at acceptable levels.

The structural test of the model was conducted by creating paths from the IVs directly to the two sets of dependent variables (i.e., Affect Intensity and Action). The PLS model with the path coefficients (in parentheses) are shown in Figure 1. Note that all coefficients are in the correct, negative direction on reversed poles. Also, we observed that in all cases, the independent variables were significantly related to the dependent measures, as the paths results were all significant at the .05 alpha level. The explained variances for affect intensity and objective action behaviors are relatively high at 49% and 37% respectively. From an overall perspective, the IVs showed clear relationships to the outcomes as captured either by subjective or objective measures.

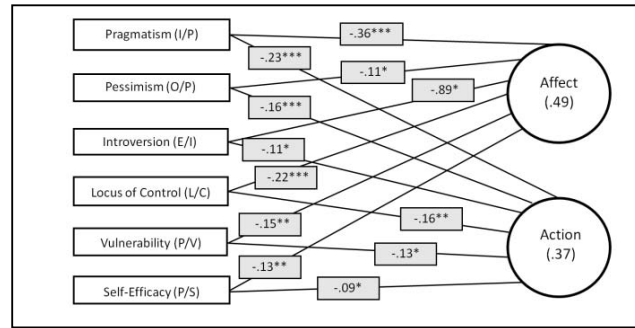


Fig. 1. Results of Structural Test of the Model
Note: * = p-value < .05, ** = p < .01, *** p < .001. (R2adj in parentheses)

VI. DISCUSSION AND CONCLUSIONS

Due the vast array of social media forms and forums, as well as unbounded populations -studying the effects of social media can be quite challenging. Research using machine learning (ML) is an increasingly popular method in helping to conquer some of the challenges. However, without guiding theory, it is difficult to draw inferences and conclusions found in a given field study using ML. We used a mixed method to identify hidden clusters of attributes from which we developed and tested our hypotheses using traditional methods. To summarize, the technological and interpersonal effects from social media have wide-ranging consequences, both positive and negative, and there is increasing consensus in the literature that social media escalates action taking (performative action). This has particular implications for negative effects, since we noted that people who are more negatively affected by social media tend to be more active, or reactive to it. In the negative case, Fischer and Roseman [34] presented that anger tends to be found in relations that are more personal and intimate, where there is some degree of interdependence with the other person and where reconciliation is ultimately desired. In this way, “rather than leading to destructive action, which would be maladaptive for relationships, anger tends to result in short-term (mostly verbal [or written]) attacks that are aimed at changing the other person’s behavior and will ultimately result in an improvement of the relationship” [35] p.3. Antecedents to operative behaviors of this sort include defensive and offensive argumentation, patronage, and negative normative actions (i.e., those actions

taken within the bounds of socially functional norms, such as protestations).

Contempt targets others who are objectified or dehumanized, and where reconciliation is not sought [34]. Research [35] has shown that contempt occurs in response to the same instances of behavior as anger, but often develops further by building upon it; for instance, when prior angry incidents continue with the same person and intransigently remain unresolved. As a result, perceptions and impressions crystallize in negative beliefs about the other person [36]. Consequently, contempt frequently produces derogation of the object of contempt, the deterioration of the relationship, and ultimately exclusion [37]. Antecedents to operative behaviors from contempt include disdain, derision, scorn, threats, and non-normative actions (i.e., those involving persecution, or extreme alienation). The relationship, at this point, is either finished, or leads to an all-out war [38].

Features seen linguistically in prose or other representations in social media combine with affect intensity of sentiments such that they lead to increasingly aggressive forms of expressions and actions, both online and physically. Continuing study in other contexts and ecosystems would be important to address the limitations in our study. For example, the next line of research could be to test for interactions among different components and actors. Moreover, there are several important gaps to fill in this line of research; for example, we would want to investigate whether performative actions result from social media as the catalyst versus whether people are predisposed to action. Are people differentially affected by modes of interaction? A laboratory study could be useful for a test such as this. One of the remaining challenges is obtaining a bounded population to study, while maintaining ecological validity that might come from an unbounded population such as Twitter.

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RESEARCH NOTE

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