Beyond Survey Self-Reports: Using Physiology to Tap Political Orientations

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Abstract

Some aspects of our attitudes are composed of things outside of our consciousness. However, traditional survey research does not use measurements that are able to tap into these aspects of public opinion. We describe, recommend, and demonstrate a procedure by which non-self-reported responses can be measured in order to test whether these responses have independent effects on individuals' preferences. We use one of the better-known physiological measures—electrodermal activity or skin conductance—and illustrate its potential by reporting our own study of attitudes toward President Barack Obama. We find that *both* self-reported emotional responses and physiological responses to Obama's image independently correlate with variation in the intensity of attitudes regarding his job approval and his central policy proposal: healthcare reform.

Keywords: public opinion, physiology, attitude intensity, measurement

Beyond Survey Self-Reports:

Using Physiology to Tap the Intensity of Political Orientations

How is an individual's response to a political concept, event, person, or object best measured? For most social scientists, the answer is simple: ask the individual to self-report responses or mental/emotional states. Self-reports, however, are unable to tap responses that are nonconscious or that people are uncomfortable revealing (Krosnick, 1991; Crites, Gabrigar, & Petty, 1994; Watson, Wiese, Vaidya, & Tellegen, 1999; Bargh & Chartrand, 1999; Bargh & Morsella, 2008; Williams & Bargh, 2008; Lodge & Taber, 2005; Hawkins & Nosek 2012). Whether non-conscious biases are called motivated social cognition (Jost, Glaser, Kruglanski, & Sulloway, 2003), automaticity (Lodge & Taber, 2005), longstanding predispositions (Zaller, 1992), antecedent conditions (Marcus, Sullivan, Theiss-Morse, & Wood, 1995), habits (Gerber, Green & Schachar, 2003), or implicit attitudes (Greenwald & Banaji, 1995), responses to a given stimulus clearly do not occur de novo, meaning self-reports provide only part of the picture.

In this research note, we highlight an underutilized method for obtaining information on people's non-conscious responses to political entities and concepts: physiological changes. The particular political concept we investigate is strength of attitude—more specifically, strength of feelings about both the job performance of U.S. President Barack Obama and health care reform—and the particular measure of physiology we employ is electrodermal activity. We now defend these selections, beginning with our focus on attitude strength.

Attitude Strength

Explaining whether people favor or oppose specific ideas, policies, and politicians is important but public opinion scholars recognize that explaining why, regardless of valence, some people have stronger feelings than others is also crucial. Attitude strength is the degree to which

the attitude resists change, is stable, influences information and decision making processes, and predicts behavior (Krosnick & Petty, 1995). The relative strength or weakness of attitudes influences framing effects (Nelson, Clawson, & Oxley, 1997), survey response (Zaller, 1992), and polarization (Taber, Cann, & Kucsova, 2009; Wagner, 2007). To use the topic of this note as an example, strength of feelings regarding the job performance of President Barack Obama likely explains whether or not people remain silent or actively defend/attack him, whether they are ambivalent to his policy initiatives or eagerly embrace/reject them, whether attitudes toward Obama do or do not affect attitudes toward people perceived to be close to him (e.g., Joe Biden), and whether Obama-related political matters motivate people to vote and otherwise get involved in the political arena.

Attitude strength clearly has behavioral consequences. For example, those with more extreme attitudes project extremity onto others, and behave and cooperate differently than those who do not have such strong attitudes. (Rutchick, Smyth, & Konrath, 2009; Van Boven, Judd, & Sherman, 2012). Strong attitudes are also associated with biased processing and increased likelihood of being polarized (Taber, Cann, & Kucsova, 2009), as well as intolerance of those with different moral convictions (Wright, Callum and Schwab 2008).

In terms of measurement beyond valence, people are known to have a difficult time consciously expressing other dimensions that make up an attitude—particularly arousal (Bassili, 1996). Therefore, self-reports requiring participants to assess specific aspects of an attiude may lead to unstable measurements that are unduly influenced by contextual cues (Bassili, 1996; Watson et al., 1999). Attitude strength is typically examined using measurements associated with accessibility but, while accessibility is certainly an indicator of attitude strength (Fazio, 1995), it is only one of many distinct elements of attitude strength (see Krosnick, Boninger, Chuang, Berrent, & Carnot, 1993; Krosnick & Petty, 1995. The multifaceted nature of attitude strength

suggests it is best to pursue a similarly multifaceted measurement strategy as it is unlikely that self-reports alone can tap all these elements.

Implicit Measures

Perhaps the best-known methodology for moving beyond survey self-reports is the family of procedures referred to collectively as implicit measures. These include implicit association tests (IATs; Greenwald, Nosek, & Banaji, 2003), affective priming (Lodge & Taber, 2005) go/no go tasks (Knowles, Lowery, & Schaumberg, 2010), affect misatribution procedures (Pasek et al., 2009; Payne et al., 2010), and extrinsic affective Simon tasks (De Houwer, 2003). The basic logic behind these techniques is that rather than self-reports, attitudes toward an object can be inferred on the basis of, for example, the time it takes people to associate the object in question with positive or negative concepts. Implicit measures are useful in supplementing self-reports of concepts as attitude strength and are widely used (even being incorporated in 2008 into the American National Election Studies (ANES).

Yet implicit measure are criticized on several fronts. The rapidity of associations between atttiude objects may reflect familiarity with the concept in question rather than any real valence, and non-naïve participants may be able to influence their measured implicit attitudes (Kim, 2003; Blanton, Jaccard, Gonzales, & Christie 2006; Blanton, Jaccard, Christie, & Gonzales, 2007; Ebert, Steffens, von Stulpnagel, & Jelenec, 2009). LeBel and Paunonen (2011) also show that reliability is low for implicit measures while measurement error is high. Of special concern for our focus on attitude strength is that implicit measurements are usually employed as measures of attitude direction and perhaps accessibility. No measure is perfect but there may be value in considering alternative indicators of non-conscious response.

Physiology and Attitude Strength

Attitude strength is partially a function of the level of emotion the attitude target triggers. This is important because emotions have physiological correlates. Physiological responses are automatic when exposed to emotionally laden stimuli (Bradley & Lang, 2007) though there is considerable individual-level variation in that response for any given stimulus. Consequently, measuring physiological response provides information about the emotional impact of a target that is not attainable via survey self-reports. As pointed out by Cacioppo and Petty in an excellent early review, psychophysiology can be useful in identifying the stages or subcomponents of social processes like attitude formation and application (1986: 646). In other words, physiological measures can go beyond predicting attitudes to helping to understand the subprocesses leading to attitudes as well as their application. Finally, measuring physiology can provide information about the nature of politics. To take one example, Blascovich et al. (1993) demonstrate that a pre-existing attitude can make it less physiologically demanding to come to a decision about works of art. If pre-existing attitudes towards political objects tend to spur rather than mitigate autonomic processes, this would say something interesting about the distinctive nature of political as opposed to artistic attitudes.

Emotional responses are typically evident in the sympathetic nervous system (SNS), best known for its role in preparing the body for action, be it greeting a loved one or fleeing a predator. Among other things, SNS activation triggers the opening of eccrine or sweat glands which alters the skin's ability to conduct an electrical current; as the glands open and draw up moisture (sweat), the skin becomes a better conductor. Measuring variation in the electrical conductivity of skin indexes SNS activation in response to a stimulus. This simple, direct, and widely employed method of measuring activation of the sympathetic nervous system is known as electrodermal activity (EDA). EDA's usefulness for indicating "emotion, arousal, and attention" is not controversial (Miller & Long, 2007). In fact, "of all forms of autonomic nervous system

activation, individual differences in EDA are most reliably associated with psychopathological states" (Dawson, Schell, & Filion, 2000, p. 211). EDA measures have been employed to study politial behavior and attitudes (Smith & Hibbing, 2011; Mutz & Reeves, 2005; Oxley et al., 2008; Soroka & McAdams, 2012). Moreover, physiological measures are especially suited for studies of attitude strength (Lemon 1973).

Still, it remains the case that typical investigations of attitudes and attitude strength do not employ EDA or any other physiological measure, perhaps due to the belief that the payoff from obtaining physiological measures is not worth it. If so, this is an assumption that should be empirically tested, which would require including in the same model measures of both physiology and self-report. That is what we do here.

In the following analysis, we combine traditional survey research methods with a measure of physiological arousal, testing to see which, if either, explain individual-level variations in the strength of attitudes regarding President Obama's job approval as well as strength of attitudes toward his signature policy proposal: healthcare. Our core hypothesis is that physiological measures tapping non-conscious elements of response to a salient political stimulus will provide information beyond that attainable by survey self-report. We are encouraged to offer this hypothesis because on those occasions when both explicit and implicit measures have been used in the same study, each has been shown to have validity with respect to the prediction of behaviors (Greenwald et al. 2009). In the summer of 2010, we hired a professional survey organization to recruit a small sample of individuals to come to a laboratory in a mid-sized Midwestern (U.S.) city. Though the initial contact was generated by random selection from lists of telephone numbers (an appropriate mix of landline and mobile numbers), the propsective participants had to be willing, in exchange for $50, to travel to a location in the city to complete the requested tasks. In spite of the travel demands imposed on the participants, the response rate

was reasonable (AAPOR RR1 = 26 percent) and the resulting group (N=343) had appropriate demographics (54 percent female, mean age of 45, modal family income category in the $40,000 to 60,000 category, with 55 percent having some college education). The one area where our participants do not look like the national population is race. Over 90 percent of our participants classified themselves as "white," a figure consistent with regional demographics but certainly not consistent with national figures.

Participants first completed a lengthy computerized survey of their political preferences and activities. In one of the items, participants were asked to report whether they approved or disapproved "of the way Barack Obama is handling his job as president" ("strongly approve," "approve," "disapprove," and "strongly disapprove." In addition, paraticipants were asked to report their level of agreement with "government-arranged healthcare" ("strongly agree," "agree," "uncertain," "disagree," and "strongly disagree"). Healthcare was a dominant issue on the American political landscape during the summer of 2010 and very much associated with President Obama; indeed, the healthcare law was coined "Obamacare." Following the logic behind many studies that assert a node structure in terms of attitude objects, Obama's image should not only activate the specific person but also salient information about him (Fazio Sanbonmatsu, Powell, & Kardes, 1986; Lodge & Taber, 2005). Given our interest in attitude strength rather than direction, responses to these questions were collapsed, so that higher scores indicated stronger attitudes regardless of direction, creating our two dependent variables, job approval intensity and healthcare attitude intensity.

Attitude strength was measured in the following fashion. Participants first were asked whether they approved or disapproved of "the way Barack Obama is handling his job as president." People who strongly approved or strongly disapproved were coded as 1 while those who approved or disapproved (but not strongly) were coded as 0. Next, participants were asked

about their attitudes towards a number of policy issues including government run healthcare policy with the response options of "uncertain," "agree/disagree," or "strongly agree/disagree," and we collapsed the variable so that uncertain was coded as 0, agree/disagree was 1, and strong responses were coded as 2.

Following the survey, participants were escorted into a lab where, using two sensors placed on the index and the middle fingers, physiological measures were recorded as participants were exposed to a variety of stimuli on a computer screen placed at eye level. Immediately following an acclimation period of 90 seconds, images appeared seriatim. Involuntary changes in participants' electrodermal activity were recorded while particiants viewed 34 different images that were displayed on the screen for 14 seconds each, with an interterstimulus interval of 8 seconds between each targetted stimulus. Eight images were formal portraits of salient politicians, the most recognizable was Barack Obama. Given relatively large variations in baseline EDA, response was calculated as total change in skin conductance (SCL) level during the first 9 seconds of viewing of the image of President Obama. The first second was used as the baseline, and this baseline was then subtracted from each of the subsequent eight measures. These differences were then summed to provide our measure of total change. Our measurement timeframe was chosen because measureable SCL response typically takes about a second from stimulus onset and will peak and be returning to baseline within eight to 10 seconds of stimulus onset (Dawson, Schell & Filion, 2007). This measure is similar to an area under the curve measure. Higher scores indicate stronger and more sustained SCL responses to the Obama image.

After the survey and the physiological session, respondents were shown the same 34 images again and asked to self-report the strength of their emotional responses. Thus, when participants viewed the picture of President Obama for the second time, they were asked, on a 1-9

scale, whether the image did or did not elicit a "strong" reaction from them, with 1 being no reaction at all and 9 being a strong reaction.

We hypothesize that involuntary physiological responses occasioned by viewing the image will correlate with the strength of attitudes toward the job being done by the president and to the strength of the attitude towards government-arranged healthcare, even when controlling for self-reported views of his image.

Results

[Table 1 and Table 2 about here]

We obtained 331 valid SCL measures from our 343 subjects. Because of a small number of outliers, we winsorized the SCL measure. Mean total change in SCL while viewing the image of Obama was .085 (Std. dev. = .041), significantly higher than the mean total change of the interstimulus interval preceding the image, $t=-3.02$, $p<.01$.

Table 1 reports the bivariate correlations for the variables in our study. We call attention to results for our key independent variables: self-report response and physiological response to Obama's image. The correlation is positive, suggesting self-reports of a strong response are linked to a stronger physiological response. Yet note that this correlation is substantively small and statistically insignificant ($p > .05$, though less than $p < .10$). This lack of a strong relationship between self-reports and physiological response is consistent with other research (e.g., Smith et al., 2011), and suggests that the way people believe they respond to a political concept or person does not capture the entirety of their response. The question now becomes whether both types of response affect the strength of political attitudes such as approval or disapproval of the job being done by the president or preferences for a particularly salient public policy.

On this matter, the correlations in Table 1 show a postive linear relationship between self-report and both physiological response to the image of Obama and intensity of job approval. The

correlation for self-report is larger but both are significant at the .05 level. Turning to strength of attitudes toward healthcare reform, both self-report and objective physiological response are positively and significantly related to strength of opinion on that key policy matter and this time it is the physiological response that is slightly larger in substantive terms. Do these intriguing patterns persist in multivariate analyses?

The dichotomous nature of our strength of job approval variable means logistic regression is the appropriate technique. Common sense expects a positive relationship between people's self-reported intensity of response to the image of the president and the strenth of their approval/disapproval of his job performance. The key qestion is whether involuntary physiological responses to the image of the president also correlate with intensity of feeling regarding President Obama's job approval before and after self-reported intensity of emotional response is controlled. If there is no independent effect of the physiological measure, the justification for going to the trouble of collecting physiological information is diminished substantially.

The results of our analysis using only physiological measures (and standard demographic controls) are presented in the first column of Table 2 where "Obama job approval intensity" is the dependent variable. The second column adds self-reported arousal to the Obama image to the model and the third adds PID strength and issue attitude intensity, two variables known to affect attitude strength (PID strength is folded party identification and overall attitude strength is the average of the folded scores for 19 available issues—all of the issues included in the survey other than healthcare). Our physiological measure (SCL in response to Obama's image) remains a robust and significant predictor of the intensity of attitudes on Obama's job approval across all of these model specifications and this impact is clearly independent of the self-report measure. On

the whole, the control variables are not especially powerful though it does seem that education lowers strength of attitude and overall issue intensity heightens it, as might have been expected.

The results in columns four, five, and six shift attention from intensity of job approval to intensity of attitudes toward "government-arranged healthcare." The analyses are largely parallel to the analyses of job approval except that attitudes toward the healthcare policy could be "uncertain," "agree/disagree," or "strongly agree/disagree," whereas with the president's job approval the "uncertain" response was not an option, therefore the estimation technique employed in the last columns is ordinary least squares (OLS) regression. The results are largely consistent with those in the first columns of Table 2 with the coefficient for SCL consistently demonstrating that higher physiological arousal is associated with more extreme attitudes toward healthcare policy no matter what controls are added. In fact, in the most fully specified model (column 6), with partisan and overall issue intensity included, the coefficient for SCL is robust but the coefficient for self-reported strength of response to Obama's image is substantively small and statistically insignificant. Physiological responses—in this case, changes in electrodermal activity—have an independent effect on the strength of people's political attitudes, just as implicit attitudes do (see Knowles at al. 2010).

Conclusion

Responses to a political stimulus, such as an image, scenario, or survey item, are not entirely formulated by human nervous system processes accessible to conscious thought (see Lodge and Taber 2013). Thus, self-reports are unable to generate a complete picture of the total relevant response. This fact is widely accepted by survey researchers (Tourangeau, Rips, & Rasinski, 2000), especially on measures of attitude intensity (Bassili, 1996). Biological measures offer a way of supplementing self-reports. Currently, physiological measures are rarely used to supplement survey methodology but this is likely to change. The costs of acquiring and utilizing

the technology necessary to tap standard physiological responses are diminishing rapidly. Standard equipment is now user friendly, financially accessible and increasingly portable. As people's responses to political stimuli cannot be fully understood without incoporating non-conscious physiological responses, the time is ripe for expanded utilization of appropriate biological techniques. Our hope is that this research note gives evidence of such possibilities.

Incorporating biological measures does not merely explain a little more variance in attitude strength, it increases understanding of the subprocesses that affect political judgments. For example, our findings suggest that people's opinions of the job being done by President Obama or of healthcare reform are shaped not just by conscious feelings but by non-consious subprocesses. Knowing this could make people somewhat more humble with regard to their own political beliefs, could indicate different research approaches (asking people what emotion they feel after being exposed to a stimulus may be insufficient), and could suggest different mechanisms for trying to persuade people to change their beliefs.

Our findings point to several promising avenues for future research. Studies using self-report and implicit measures (Payne et al., 2010; Pasek et al., 2009; Greenwald et al., 2009) find unique effects for each just as we find unique effects for physiological measures and self-report. Combining all three—self-reports, implicit measures, and physiological measures—in a single model may yield additional insights into how conscious awareness, physiological processes, and implicit attitudes interact. Finally, another promising avenue involves moving beyond dependent variables such as job approval and analyzing the connection between physiological responses to a political object, person, or concept and overt political behaviors relevant to that object, concept, or person.

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Table 1. Correlations, Means, and Standard Deviations for all Variables

	Self-Report	SCL	Male	Age	Education	Income	Obama Approval	Healthcare Approval	Strong Partisan	Attitude Extremity
Self-report Intensity (to Obama Image)	1									
SCL (Obama's Image)	.108*	1								
Male	-.056	-.001	1							
Age	.249**	.016	.024	1						
Education	.031	.081	.035	.146**	1					
Income	.035	.088	.074	.153**	.225**	1				
Obama Approval Intensity	.380**	.138**	.075	.054	-.078	.000	1			
Govt. Healthcare Intensity	.186**	.196**	.142**	.008	.015	.039	.340**	1		
Strong Partisan Dummy	.211**	.098*	-.010	.060	.098*	.068	.198**	.261**	1	
Issue Attitude Extremity	.349**	.026	.189**	.060	.068	.090	.450**	.261**	.281**	1
Mean	5.720	.085	.459	45.590	5.690	3.540	.303	1.11	.211	20.06
Std. Dev.	2.228	.752	.499	13.039	1.725	1.699	.460	.781	.409	5.66
N	327	327	327	327	327	327	327	327	327	327

*p<.10; **p<.05

Table 2. Relationships with SCL alone and with SCL and SR

	Obama Intensity# (Without SR)	Obama Intensity# (With SR)	Obama Intensity# (With SR) Controlling for PID & Issue Attitude Intensity	Healthcare Intensity## (Without SR)	Healthcare Intensity## (With SR)	Healthcare Intensity## (With SR) Controlling for PID & Issue Attitude Intensity
Male	.354 (.25)	.58 (.27)*	.292 (.30)	.221(.09)*	.239 (.08)**	.122 (.08)
Age	.012 (.01)	-.007 (.01)	.000 (.01)	.000 (.00)	-.003 (.00)	-.002 (.00)
Education	-.128 (.07)*	-.126 (.08)	-.172 (.09)**	-.004 (.03)	-.003 (.03)	-.016 (.02)
Income	-.009 (.08)	-.011 (.08)	-.055 (.09)	.006 (.03)	.007 (.03)	-.006 (.02)
Issue Extremity	---	---	.186 (.03)**	---	---	.051 (.01)**
Strong Partisan	---	---	.288 (.34)	---	---	.274 (.10)**
Self-report Intensity (to Obama Image)	---	.500 (.08)**	.337 (.08)**	---	.065 (.02)**	.007 (.02)
SCL (Obama's Image)	.415 (.16)**	.339 (.17)**	.444 (.19)**	.203 (.06)**	.183 (.06)**	.182 (.05)**
Constant	-.843 (.59)	-3.185 (.76)**	-5.902 (.99)**	.994 (.20)**	.735 (.21)**	.107 (.22)
N	327	327	327	327	327	317
F/-2LL	388.887	335.942	286.558	4.016**	5.346**	12.787**
R^2	.036	.180	.281	.059	.091	.243
Δ R^2					0.032	.152
Δ R^2 F					11.350**	32.003**

Logistic regression, unstandardized coefficient (standard error), Cox and Snell R^2 reported.
OLS regressions, unstandardized coefficient (standard error) reported
*p<.10; **p<.05