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Virtue in Real Life: Using Smartphones to Coordinate Self, Observer, and Behavioral Data of Virtue

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Virtue in Real Life: Using Smartphones to Coordinate Self, Observer, and Behavioral Data of Virtue

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Abstract: Current methods of assessment limit the scientific study of virtue. Specifically, assessment relies almost exclusively on retrospective self-reports that ask people to rate the degree to which they exhibit a particular trait. Reporting biases limit the usefulness of this approach in assessing virtue. Observer reports address some of these limitations, but are fraught with their own limitations. For both empirical and conceptual strength, a more nuanced view of virtue requires a combination of these reports. I propose that an Internal/External Model best characterizes virtue. In this model, virtue is a combination of an admirable internal state of feeling and judgment that tends to produce morally appropriate external actions. As such, the assessment of virtue requires the assessment of virtuous behavior (how well does a person do at acting in morally appropriate ways) and virtuous intentions and feelings (how admirable is the person's inner state of character). In the presentation, I will describe technological tools developed at the Center for Behavioral Intervention Technologies that gather information from users and their contexts to infer psychological states. I will then discuss the development of a networked virtue assessment (NOVA) application for use in smartphones.

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Virtue is an excellent state of character that is expressed through actions. A person who is virtuous has a stable disposition to do the right thing in the right circumstances for the right reasons and acts on this disposition. Virtues can be distinguished from each other by the circumstances in which they govern action. For example, gratitude is the virtue that operates when one receives help or favors. Integrating these notions, the virtuous state of character has both internal and external dimensions. That is, a virtuous person has good intentions and appropriate emotional responses to his or her circumstances; he or she also succeeds in acting in a morally appropriate way. A person with the virtue of kindness is sympathetic to others, feels good about being nice to other people (does not do it grudgingly), and has the skills necessary to make other people feel more at ease. This Internal/External Model views virtue as a combination of an admirable internal state of feeling and judgment that tends to produce morally appropriate actions. This model draws on the notion that virtues involve specific intentional and emotional tendencies (Adams, 2006; Dent, 1984; Hursthouse, 1999).

Following from this Internal/External Model, the assessment of virtue requires assessing both virtuous behaviors (how well does a person do at acting in morally appropriate ways) and virtuous intentions or feelings (how admirable is the person's inner state of character). Addressing both of these components, however, requires the integration of diverse sources of information. The internal component (e.g., virtuous intentions and feelings) must be addressed by methods that query the inner workings of

an individual (e.g., thoughts and emotions), whereas, the external component requires information about the individual's behaviors.

With regards to virtue, it might be most enlightening to gather this information from different sources. Individuals might underreport their virtuous behaviors especially when these behaviors are consistent with internal states or beliefs that downplay the uniqueness of the event (e.g., "Anybody would have done that in the same circumstance" or "I did not do anything special, that's just who I am"). Indeed, this "false consensus" bias is apparent in many instances where individuals are asked to predict other people's behavior (Ross, Greene, & House, 1988; Marks & Miller, 1987) and social projection theory posits that people project onto others what they know about themselves (Krueger, 1998; 2000). Both of these theories also have implications for the way a person views him or herself and posit that one's view of one's own behavior is tainted by one's perspective and vantage point. Alternatively, people motivated to present themselves in the best possible light might over report virtuous characteristics and actions (cf. Peterson & Park, 2004, for a discussion of social desirability biases relationship with character strengths). Therefore, enlisting other methods that make use of observation of virtuous behavior is critical to provide a proper understanding of the virtuous actions of an individual (e.g., scenario methods or behavioral tasks, see Peterson & Park, 2004). Enlisting observers to complete reports of behavior is one such method that maintains the ability to assess virtue in its natural context rather than artificial laboratory settings. Intentions, however, are privileged to the individual. Accordingly, only self-report can produce this information and thus produce a complete picture based on this Internal/External model.

Although both self and observer reports have been used in the assessment of virtue (e.g., Cohen, Panter, Turan, Morse, & Kim, 2013; Peterson & Seligman, 2004; Proyer, Sidler, Weber, & Ruch, 2012), when coordinated these reports focus on global evaluations of virtue. As a result, this provide knowledge about how one views his or her own character or actions with regards to virtue or how he or she is viewed by other people within their social network. It might be more useful to focus forms of assessment on information that each reporter is privileged to, which are discrete behaviors for observer-reports and internal states for self-reports. Furthermore, given the proper assessment methods, self and observer reports targeted at the same discrete behavioral action could be integrated as the action unfolds in real-time to reduce the likelihood of retrospective reporting biases or other factors that might diminish the information gleaned from measurement.

Mobile smartphone applications provide a tool that can be harnessed for exactly this purpose. Smartphones provide advanced computing capacity, nearly constant access to the Internet, and contain sensors that gather a wealth of data. In the United States, 35% of adults currently own smartphones and it is projected that most of the people in the world will carry smartphones by 2025 (Smith, 2011). Smartphones have already been used extensively in psychological research and practice to collect data and conduct experiments (see Miller, 2012; Schueller, Muñoz, & Mohr, 2013). Continued technological advances and increased market penetration will likely expand their usefulness. Relevant to the current discussion, smartphone applications offer the potential to significantly expand the measurement of virtue by being able to coordinate self, observer, and behavioral data and conduct assessment in real-time using the

Internal/External Model. The Center for Behavioral Intervention Technologies (CBITs) at Northwestern University has created an extensible framework for the development of smartphone applications for behavioral research and several applications based on this framework. Drawing on work completed at CBITs, I will discuss the capabilities afforded by current smartphone applications and their relevance to the assessment of virtue with the design of a Networked Virtue Assessment (NOVA) that could be deployed in a social network to provide a nuanced understanding of the virtuous intentions and actions of individuals.

What is the Benefit of Including Observer and Behavioral Data?

A major objective of the NOVA is to move beyond self-reports by including observer and behavioral data in the assessment of virtue. Self-report data is widely used in the assessment of personality in psychology (see Funder, 2001; Ozer & Reise, 1994). However, people may be inaccurate in their reports of their traits (McCrae, 1982) and are biased in their recall of specific details of past behavior and states (Robinson & Clore, 2002). Thus, a proper assessment of virtue must supplement self-report data with other types of information. This justifies the need for the Internal/External Model of virtue presented earlier.

The rationale guiding this model draws on the Johari window model (Luft & Ingham, 1955) and the self-other asymmetry (SOKA) model (Vazire, 2010) that discuss aspects of personality that are more likely to be accurate when judged by the self versus observers. According to the SOKA model, the self and others have better access to different knowledge and information and thus are better judges of different aspects of personality. Specifically, the self has privileged access to thoughts and feelings, whereas

others are better able to observe patterns of behavior. Consequently, the self should be more accurate about aspects that describe unobservable thoughts and feelings (the internal dimension of virtue), and others should be more accurate about aspects that describe observable aspects of personality (the external dimension of virtue). In line with the Internal/External Model of virtue, the assessment of virtue requires using knowledge of both oneself and others to capture elements of motivation and behavior that are crucial for the assessment of virtue. Additionally, other internal states may be useful to assess in relation to virtuous actions. Aristotle, for example, thought that pleasure completes virtue “as the bloom of youth does on those in the flower of their age” (1174b33, Ross, 1984) and learning about people’s emotional states may provide information both about when people are likely to perform specific behaviors (e.g., do people act more virtuously when they are experiencing pleasure?) and the consequences of performing these behaviors (e.g., does performing particular acts boost pleasure?). Following from this, tools developed within the context of behavioral interventions to assess mood states, thoughts, and behaviors are useful resources for the assessment of virtue.

The Purple Development Environment: Building the NOVA

The Purple Development Environment (hereafter: Purple) facilitates the development and deployment of interactive websites and mobile applications. Purple is a modular, extensible framework created using a combination of open-source technologies that rely on a combination of Linux, Python, and MySQL server technologies, but are also heavily focused on modern Javascript browser technologies. Purple has been used to create a number of websites and mobile applications in the service of the creating interventions aimed at improving physical, behavioral, and mental health. Most these

interventions include assessment elements and Purple contains many features that allow for the creation of assessment questions, scheduling the release of these questions, and collection of data related to what is answered and where, when, and how long these questions are answered. In addition to questions provided to the end user, data collection is also facilitated by a real-time mobile phone sensor data acquisition platform (“Purple Robot”) that can collect all available data from Android phones. This data, in turn, can be used by the system to trigger additional assessments and is entered into the data storage as additional data on the end user.

Purple has been used to develop several projects and currently CBITs and Purple supports more than 50 projects in the United States, Africa, and South America. One such example, Mobilyze, is a smartphone application that uses context-sensing and machine learning to predict a patient’s mood and deliver “just-in-time” interventions responsive to low mood states (Burns et al., 2011). In a pilot trial of Mobilyze, the context-aware system was trained by querying users to report their current states at least 5 times a day (Burns et al., 2011). Participants rated mood, discrete emotions (e.g., happiness, sadness), fatigue, pleasure, sense of accomplishment, concentration, and perceived control using a 7-point Likert scale. Within Purple, programming code that specifies the action to take when a certain condition occurs controls these assessments. For Mobilyze, the condition was based on a date and time generated by a random algorithm that occurred at random times between 7am and 10pm (these times were modifiable by the participants).

The NOVA application makes use of the features developed within Purple that made Mobilyze and other similar applications possible. The application includes two functions: data entry and notification. When a person witnesses someone else in their

social network perform a behavior related to one of the target virtues (i.e., expressing kindness, gratitude, or forgiveness) they can enter information about this behavior into the NOVA (external component). The NOVA application is programmed such that when an observer enters data about an individual, this is the specified condition that will trigger a self-report questionnaire on the performer's smartphone device that assesses intentions and emotions (internal component). At the same time, the NOVA application will take a "snapshot" of this time period with all 38 available sensors from both the observer and performer's smartphone device. This snapshot includes feature such as the time of day, location, visible Bluetooth, etc. Figure 1 presents a mock-up of the design of some of the features of the NOVA application.

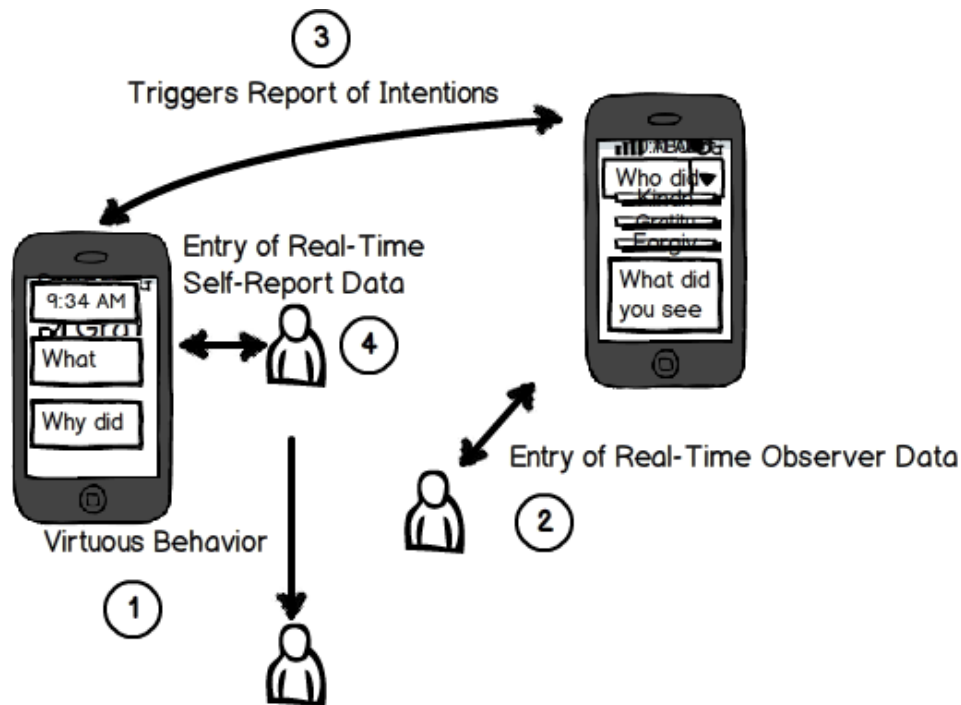
Figure 1. Assessment Features of the NOVA Application



Figure 2 displays a model of the use of the NOVA application for real-time assessment of virtue: (1) a target performs a behavior, (2) an observer enters information related to that behavior into the NOVA (external component, observer), (3) the NOVA triggers an assessment for the target, (4) the target completes an assessment of

motivation, emotion (internal component, self), and the behavior (external component, self).

Figure 2. Demonstration of the NOVA Application Use



In addition to these real-time assessments of virtue, the NOVA application will provide each user with an end of day questionnaire that allows him or her to review any unanswered triggered assessments and label these time periods with the relevant self-report measure. In order to facilitate recall of the time period, the application presents sensor data from the “snapshot” created by the application including time of time, location, and ambient noise. Indeed, “lifelogging” information is an effective way to boost recall and facilitate people’s ability to provide accurate data about past events (e.g., Sellen et al., 2007).

In the service of simplifying the working and evaluation of the NOVA platform, the scope of virtues assessed was limited to 3 specific virtues: kindness, gratitude, and

forgiveness. These virtues were selected as they are other-focused and can be expressed behaviorally. Therefore, users of the NOVA application look for and report instances of these virtues when they occur within a specified context in which the application is deployed.

Use of the NOVA Application

The NOVA application was designed for use within real-world social networks. Its use requires significant penetration of the application within the network such that individuals performing a virtuous action and observers both have instances of the NOVA application available on their mobile smartphones. As such, its use is ideal for school, work, or military settings with organizational frameworks that can help its dissemination. When deployed in these contexts, however, the NOVA application does not only provide a fundamentally new method of measuring virtue in real-time from multiple perspectives, but it also has the potential to study and promote virtue within these communities. Given that users of the NOVA application exist within the same social network, one can study how virtuous actions spread throughout individuals and might be linked to other actions performed within a social network. Furthermore, intervention strategies and instructions can be inserted into the system in addition to assessments in attempts to not only monitor virtue, but increase it as well.

As mentioned earlier, questions included in the NOVA application examine the emotional precursors and consequences of performing virtuous actions. Other elements, for example instructional content, visualizations, game mechanics, could be added to the NOVA in attempts to promote virtuous behavior. In this way, the NOVA application could both deploy and evaluate an intervention aimed at increasing virtue in a specified

context. Further development of the intervention capacities of the NOVA would be easily accomplished due to Purple's modular and extensible nature.

Conclusion

Assessing virtue from only one vantage point limits the likelihood that the assessment will capture all aspects relevant for a nuanced understanding of virtue. The Internal/External Model of virtue highlights the need for both observer and self-reports to express the components that are key for characterizing an individual as virtuous with regards to a target virtuous trait. Gathering information related to both internal and external components, however, requires tools that can integrate data from different sources and coordinate this in real-time. Real-time assessment of internal states and external actions also has a separate benefit of reducing bias stemming from retrospective measures or global accounts. Various tools developed at CBITs at Northwestern University makes this coordination possible. These tools have been applied to a variety of behavioral research issues and some are available as open-source code for those interested to applying them to different domains (tech.cbitts.northwestern.edu). For the study of virtue, these tools offer powerful possibilities to explore in more detail the Internal/External model and understand virtuous intentions and behaviors as they unfold within a social network. The NOVA application platform offers one solution to the problem of the assessment of virtue but further solutions can come from more dedicated work on the assessment of virtue using technological tools.

References

- Adams, R. M. (2006). *A theory of virtue: Excellence in being for the good*. New York: Oxford University Press.
- Burns, M. N., Begale, M., Duffecy, J., Gergle, D., Karr, C. J., Giangrande, E., & Mohr, D. C. (2011). Harnessing context sensing to develop a mobile intervention for depression. *Journal of medical Internet research, 13*, e55.
- Cohen, T. R., Panter, A. T., Turan, N., Morse, L., & Kim, Y. (2013). Agreement and similarity in self-other perceptions of moral character. *Journal of Research in Personality, 47*, 816-830.
- Dent, N. J. H. (1984). *The moral psychology of the virtues*. Cambridge, UK: Cambridge University Press.
- Funder, D. C. (2001). Personality. *Annual Review of Psychology, 52*, 197-221.
- Hursthouse, R. (1999). *On virtue ethics*. New York: Oxford University Press.
- Krueger, J. (1998). On the perceptions of social consensus. In M. P. Zanna (Ed.), *Advances in Experimental Social Psychology* (Vol. 30, pp. 163-240). San Diego, CA: Academic Press.
- Krueger, J. (2000). The projective perception of the social world: A building block of social comparison processes. In J. Suls & L. Wheeler (Eds.), *Handbook of social comparison: Theory and research* (pp. 323-351). New York: Plenum/Kluwer.
- Luft, J., & Ingham, H. (1955). The Johari Window, a graphic model for interpersonal relations. Los Angeles: University of California, Los Angeles.
- Marks, G., & Miller, N. (1987). Ten years of research on the false-consensus effect: An empirical and theoretical review. *Psychological Bulletin, 102*, 72-90.

- McCrae, R. R. (1982). Consensual validation of personality traits: Evidence from self-reports and ratings. *Journal of Personality and Social Psychology*, *43*, 293-303.
- Miller, G. (2012). The smartphone psychology manifesto. *Perspectives on Psychological Science*, *7*, 221-237.
- Ozer, D. J., & Reise, S. P. (1994). Personality assessment. *Annual Review of Psychology*, *45*, 357-388.
- Peterson, C., & Park, N. (2004). Classification and measurement of character strengths: Implications for practice. In P. A. Linley and S. Joseph (Eds.), *Positive Psychology in Practice* (pp. 433-466). Hoboken, NJ: John Wiley & Sons, Inc.
- Peterson, C., & Seligman, M. E. P. (2004). *Character strengths and virtues: A handbook and classification*. Washington, DC: APA Press and Oxford University Press.
- Proyer, R. T., Sidler, N., Weber, M., & Ruch, W. (2012). A multi-method approach to studying the relationship between character strengths and vocational interests in adolescents. *International Journal for Educational and Vocational Guidance*, *12*, 141-157.
- Robinson, M. D., & Clore, G. L. (2002). Belief and feeling: Evidence for an accessibility model of emotional self-report. *Psychological Bulletin*, *128*, 934-960.
- Ross, L., Greene, D., & House, P. (1977). The false consensus effect: An egocentric bias in social perception and attribution processes. *Journal of Experimental Social Psychology*, *13*, 279-301.
- Ross, W. D. (1984). *The complete works of Aristotle: The revised oxford translation*. J. Barnes (Ed.), Volume 2, revised by J. O. Urmson. Princeton: Princeton University Press.

- Schueller, S. M., Muñoz, R. F., & Mohr, D. C. (2013). Realizing the potential of behavioral intervention technologies. *Current Directions in Psychological Science*, 6, 478-483.
- Sellen, A. J., Fogg, A., Aitken, M., Hodges, S., Rother, C., & Wood, K. (2007, April). Do life-logging technologies support memory for the past?: an experimental study using sensecam. In *Proceedings of the SIGCHI conference on Human factors in computing systems* (pp. 81-90). ACM.
- Smith, A. (2011). *Smartphone adoption and usage*. Pew Research Center, Washing, DC. Retrieved from <http://pewinternet.org/Reports/2011/Smartphones/Summary.aspx>.
- Vazire, S. (2010). Who knows what about a person? The self–other knowledge asymmetry (SOKA) model. *Journal of Personality and Social Psychology*, 98, 281-300.