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Skidmore Clips of Neutral and Expressive Scenarios (SCENES): Novel Dynamic Stimuli for Social Cognition Research

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Novel dynamic stimuli for social cognition research

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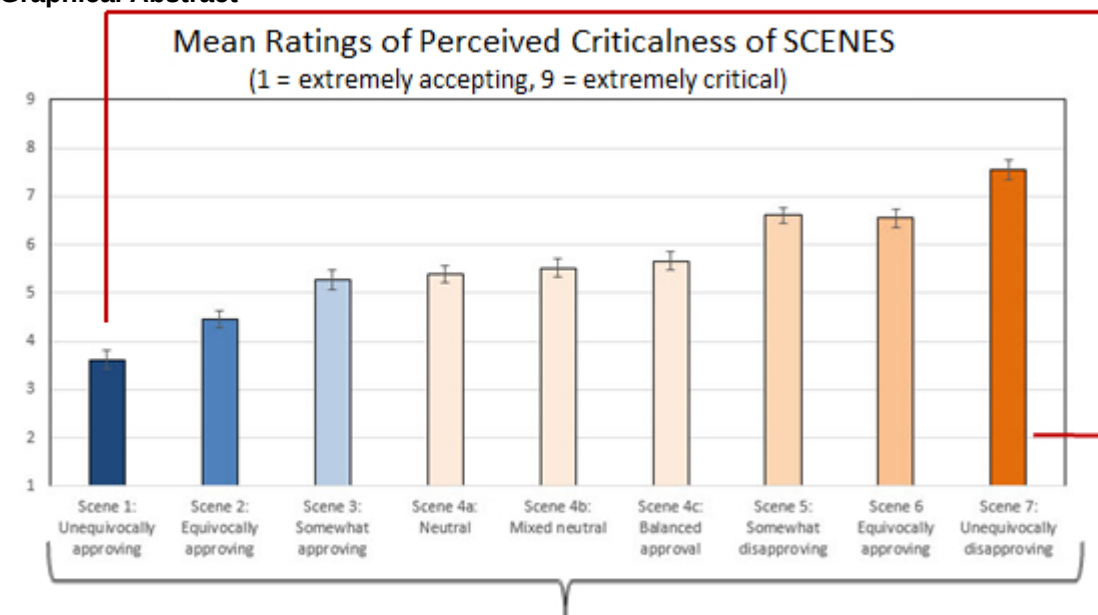
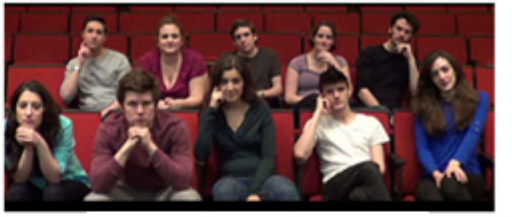
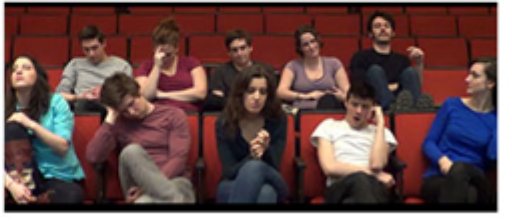
Graphical Abstract





Screen shot of scene 1



Screen shot of scene 7

Highlights

- Static emotional stimuli may have limited external validity in representing the social world
- SCENES is a stimulus set of nine 5-minute videos of an audience for use in social cognition research
- Validity data indicate that SCENES represent the intended range of emotional feedback
- The SCENES stimuli are freely and publicly available for download at scenesstimuli.com

Abstract

Social cognition research has relied primarily on photographic emotional stimuli. Such stimuli likely have limited ecological validity in terms of representing real world social interactions. The current study presents evidence for the validity of a new stimuli set of dynamic social SCENES (Skidmore Clips of Emotional and Neutral Expressive Scenarios). To develop these stimuli, ten undergraduate theater students were recruited to portray members of an audience. This audience was configured to display (seven) varying configurations of social feedback, ranging from unequivocally approving to unequivocally disapproving (including three different versions of balanced/neutral scenes). Validity data were obtained from 383 adult participants recruited from Amazon's Mechanical Turk. Each participant viewed three randomly assigned scenes and provided a rating of the perceived criticalness of each scene. Results indicate that the SCENES reflect the intended range of emotionality, and pairwise comparisons suggest that the SCENES capture distinct levels of critical feedback. Overall, the SCENES stimuli set represents a publicly available (www.scenesstimuli.com) resource for researchers interested in measuring social cognition in the presence of dynamic and naturalistic social stimuli.

Keywords: stimuli, dynamic, audience, validated, social, cognition, critical

1.) Introduction

The evaluation of social cognition is a rich interdisciplinary literature that draws heavily from cognitive psychology in order to understand how individuals process and make sense of information in their social world. Within clinical psychology, social cognition research has garnered significant attention given the purported role of social cognitive biases in both the etiology and maintenance of common mental health problems (cf. Williams et al., 1997). This area of research employs experimental paradigms such as the emotional dot-probe (e.g., Garner et al., 2006), the face-in-the-crowd task (e.g., Gilboa-Schechtman et al., 2005), the emotional morphing task (e.g., Gibb et al., 2008) and emotional face recognition tasks (e.g., Ridout et al., 2003) in order to measure proposed cognitive biases for social stimuli. Such experimental work characterizing the presence and nature of social cognitive biases has importantly contributed to our current understanding of emotional disorders, including (but not limited to) social anxiety disorder (Heimberg et al., 2014), autism (Senju, 2013), and depression (Peckham et al., 2010). However, this previous research has relied primarily on methods that present participants with either schematic (e.g., Öhman et al., 2001) or static photographic emotional stimuli (e.g. Gotlib et al., 2004; Staugaard, 2010), even when cognitive processes are being measured dynamically (e.g., Armstrong and Olatunji, 2012). Although existing photographic stimuli enable strong experimental control, they may lack optimal ecological validity with regard to important characteristics of social interactions, which are both dynamic and nuanced in comparison to the static stimuli used in most social cognition studies. Further, previous work suggests that static stimuli yield an incomplete picture of the nature of social cognition in comparison to dynamic stimuli, and for this reason there has been a call for the increased use of dynamic stimuli in this research (Zaki and Ochsner, 2009; Risko et al., 2012).

Evidence from fMRI work with unselected samples indicates that dynamic facial stimuli yield enhanced brain activation patterns (Sato et al., 2004; Trautmann et al., 2009) as well as greater self-reported arousal (Sato and Yoshikawa, 2007) in comparison to static images. Such findings raise concerns about drawing conclusions about social cognition based exclusively on static images in research. In particular, dynamic stimuli have been shown to elicit maladaptive social responses in individuals with developmental/psychiatric conditions even when static stimuli reveal no such effects (Speer et al., 2007). For this reason, researchers have underscored the importance of replicating studies that evaluated social cognition using static stimuli with dynamic stimuli (see Yoon et al., 2009). In short, previous social cognition research has been limited in evaluating the nature of social cognition in real-world situations. One significant impediment to progress in this area is the availability of standardized dynamic social stimuli.

The majority of previous work evaluating the processing of dynamic social stimuli has focused on single actors/models viewed one-at-a-time. Although this represents an important step towards improving the generalizability of social cognition research, such stimuli may be limited in effectively eliciting the social cognitive biases which typify the complex and myriad social situations that provoke anxiety for participants (e.g., public speaking). For example, threatening social situations are often characterized by interacting with an audience of multiple people, and experiencing social feedback in the form of both facial expressions and body language. Previous attempts to evaluate social cognition in such dynamic interpersonal settings have included the use of computerized virtual reality stimuli (Cornwell et al., 2006; Muhlberger et al., 2008; Schilbach et al., 2006); however, to our knowledge, a structured stimulus set of dynamic clips of a scenario in which actors depict varying degrees of social feedback has yet to be made available to researchers. The goal in developing the Skidmore Clips of Emotional and

Neutral Expressive Scenarios (SCENES) was to address this meaningful limitation to research in social cognition.

It has been noted elsewhere that social stimuli with strong external validity pose methodological challenges (Risko et al., 2012). The current study attempted to address these methodological challenges by maintaining control of between stimuli variability (in terms of setting, actors, clothing, lighting, scenario, etc.) while nevertheless manipulating the emotional feedback expressed by actors across scenes. The SCENES stimulus set includes a total of nine 5-minute videos, each depicting an audience of 10 actors (5 males, 5 females). In each scene, the members of the audience are acting as though they are listening to a presentation/speech. The decision to create clips of an audience was motivated by the high prevalence of both fear of public speaking (upwards of 34% of the population; Stein et al., 1996) and social anxiety disorder (upwards of 13% of the population; Kessler et al., 2012). As such, these stimuli may be of value to researchers interested in understanding responses to social threat generally (such as research employing the Trier social threat task; e.g., see Kirschbaum et al., 1993), or specifically in relation to social anxiety disorder (SAD; characterized by a pervasive fear of being embarrassed or negatively evaluated by others; American Psychiatric Association [APA], 2013). For each clip, actors were provided a "script," such that they were instructed to appear *critical*, *neutral*, or *approving* towards the video camera throughout each clip (thereby simulating the delivery of these various emotions as if to a “presenter”). The SCENES vary in the distribution of actors depicting each of these responses, thus varying the emotional content of each clip. For example, in scene 1, all of the actors were scripted to appear approving, whereas for scene 7 all actors were scripted to appear critical. Scenes 2 thru 7 increase sequentially with regard to the number of actors who are depicting critical (versus accepting) feedback (see Table 1 for details),

with the exception that scenes 4a, 4b, and 4c were all designed to depict varying configurations of a balanced audience with regard to acceptance versus criticality.

Social information processing is imperative to humans' ability to effectively navigate their world. As such, theoretical models of emotional disorders often implicate social cognitive biases in the development and maintenance of disorders in question. Arguably, the measurement of such biases via currently available (i.e., primarily static and/or computerized) stimuli may have limited generalizability and ecological validity regarding the social world. The current study presents evidence for the validity of a new stimuli set of dynamic social scenes that was designed to address these limitations.

2.) Method

2.1. Stimuli Creation

SCENES Stimuli Development. In order to create these stimuli, undergraduate students were recruited from the Skidmore College's theater department (N = 11; 54.5% women). Actors' ages ranged from 18-21 (M=20.18, SD=1.08) and all of the actors were Caucasian and not Hispanic/Latino/a. Theater students were specifically recruited given that their academic coursework includes training in how to depict scripted emotional responses, thereby maximizing the believability of the emotional cues. These 11 students self-selected to be filmed in the clips in response to posters around campus and an announcement at the weekly theater department meeting. Actors completed an information session prior to filming in which they were introduced to the goals of the current study. During this session the researchers reviewed the use of static stimuli in previous research, the limitations of cognitive bias research using static stimuli, and the potential benefit of dynamic stimuli in comparison. Public speaking was discussed as a common example of an anxiety-inducing situation. The researchers explained that the goal of the

study was to film scenes simulating a small audience for use in this area of research. Actors were compensated $5 for participating in the information session. When the recruited theater majors communicated that they understood the goals of the study, they were asked to provide informed consent and advised on appropriate attire to be worn while the scenes were filmed (i.e., solid colored shirt/pants, no jewelry, or glasses) for filming at a subsequent meeting. The actor attire details were selected in order to: (a) reduce the presence of distracting stylistic elements in the stimuli and (b) in an attempt to limit the extent to which the stimuli would appear dated over continued use in future studies. One (woman) student was identified to serve as the director for the SCENES given her past directorial training (thus also resulting in equally distributed sexes for the actors in the clips). She advised the actors on properly displaying the assigned emotional content and provided feedback to the actors as needed during the filming. The remaining 10 participants were assigned positions for each of the nine SCENES (see Table 1 for details).

Prior to filming, the student director reviewed the three emotional states the actors were assigned to depict. Actors portraying *accepting* were told to exhibit positive emotional feedback by nodding, making "eye contact" (i.e., looking directly at the camera), raising eyebrows to convey interest, leaning forward, and holding their chin in a manner indicating engaged attention. Actors portraying *critical* were told to exhibit negative emotional feedback by avoiding "eye contact" (i.e., not looking directly at the camera), fidgeting to reflect boredom with the "presenter", checking their watch, subtly rolling their eyes, playing with their hair, sighing heavily, and exhibiting annoyed expressions. Finally, actors who were portraying neither approval nor disapproval were instructed to remain as *neutral* as possible by maintaining a blank expression while making "eye contact" (i.e., looking directly at the camera) and moving very little. The actors ran through several practice scenes where the director and researchers made

recommendations to the actors as necessary. Upon completion of filming, all actors were given a $30 gift card. All of the SCENES are publicly available at www.scenesstimuli.com (see also screenshots of scene 1 and scene 7 in Figures 1 and 2, respectively). Of note, the SCENES were filmed in full color and include both audio and visual.

2.2. Stimuli Validation

2.2.1. Participants

Research participants consented to the study through Amazon's Mechanical Turk (mTurk) website. Mechanical Turk is a website where potential participants can access a variety of research studies referred to as "Human Intelligence Tasks" (HITs). That is, mTurk enables companies and researchers to pay "workers" who select HITs of interest to them and are paid for their time (for more information about mTurk recruitment see Behrend et al., 2011). Previous research has shown that mTurk data is of the same or higher psychometric quality as data from published research using both traditional and other web-based samples (Behrend et al., 2011; Shapiro et al., 2013). In addition, the mTurk participant pool represents a more diverse population than typical Internet samples and college pools (Behrend et al., 2011; Burhmester et al., 2011) thereby yielding enhanced generalizability of findings.

In order to be eligible to participate in the current study participants had to 1) reside in the U.S., and 2) have completed at least 95% of their previous HITs successfully (researchers either approve or disapprove of a worker's HIT once it has been completed). Of the 383 participants who initially consented to the study, 246 (64%) completed the demographics section, which was presented at the conclusion of the ratings of the stimuli. The sample was 58.9% women and 80.9% White. The mean age was 34.8 years (SD = 12.5), and 47.8% had completed a

4-year college degree (or higher). These characteristics are comparable to those reported in previous mTurk samples (Behrend et al., 2011).

2.2.2. Materials

SCENES ratings. Data collection was conducted via Qualtrics software (once selecting the HIT in mTurk, participants were directed to a link that brought them to the study in Qualtrics). Each participant was randomly assigned to watch three of the nine SCENES (only three SCENES were presented per participant in order to reduce the possibility of participant fatigue/inattention from watching all nine 5-minute videos). As such, the number of participants who rated each clip varied slightly (i.e., Scene 1: $n = 89$, Scene 2: $n = 84$, Scene 3: $n = 85$, Scene 4a: $n = 89$, Scene 4b: $n = 87$, Scene 4c: $n = 85$, Scene 5: $n = 93$, Scene 6: $n = 88$, Scene 7: $n = 86$). Following consent, participants were presented with the following instructions:

> "You will be presented with three different 5 mins. videos of an audience consisting of 10 people. For each of the videos we would like you to **think about giving a speech to this audience of people.** After you've watched the entire video, we want to get a sense of your perception of the audience <u>in general</u> (i.e., not a single actor).
>
> For each video we ask you to make a rating on a scale from 1 (Extremely Accepting) to 9 (Extremely Critical). When providing ratings please think about on the whole, do you perceive the audience to be very accepting of you? Very critical? Somewhere in between? There are no right or wrong answers to these questions, please feel free to use the full range of the scale."

The survey was programmed such that participants could not provide a rating for a video until the full 5 minutes of the scene was displayed. Following each clip participants were asked to

provide a rating for the clip on a scale from 1-9, with anchors provided at 1 (Extremely Accepting), 3 (Very Accepting), 5 (Neutral), 7 (Very Critical), and 9 (Extremely Critical).

2.3. Procedure

After consenting to participate in the study through mTurk, participants read the informed consent and responded by indicating either "I agree" or "I decline." Participants who consented to complete the study then viewed three randomly assigned clips and were prompted to provide ratings after each clip followed by a series of self-report measures. For each scene rating and all self-report assessments participants were provided the option "I prefer not to answer." After completing the study all participants were given a completion code to collect their compensation of $0.50 (complies with standard pay-scale of mTurk tasks; Buhrmester et al., 2011) and given the option to be debriefed.

3.) Results

Demographics and SCENES ratings. Given that the study design randomly assigned participants to only three of nine potential levels of the independent variable (i.e., scene criticalness), we conducted separate analyses for each level of scene evaluating whether criticalness ratings differed according to demographics characteristics. Emotionality ratings did not differ for any of the SCENES as a function of race (White/Person of Color; largest t= 1.61, smallest p = 0.12), age (largest r = 0.13, smallest p = 0.23) or education level (4-yr College Graduate/Non-College Graduate; largest t = 0.69, smallet p =0.49). There were, however, significant differences between males and females for two of the SCENES. That is, female participants rated scene 5 (M = 6.98, SD = 1.51) as more critical than males (M = 6.23, SD = 1.68; $t(87) = 2.20$, p = 0.03, d = 0.50). The same pattern presented for scene 6 such that females

(M = 6.84, SD = 1.68) rated it more critical than males (M = 6.05, SD = 1.73; $t(83) = 2.14$, p = 0.04, d = 0.46).

SCENES ratings. Overall, emotionality ratings reflected the assigned range of emotionality of the SCENES. For each clip, participants provided a rating on a 1-9 scale where 1 indicates "Extremely Accepting" and 9 indicates "Extremely Critical" (0% of participants indicated "I prefer not to answer" for the scene ratings). As intended by the scripting of each clip, in general the criticalness ratings increased from Scene 1 to Scene 7 (see Table 2; Figure 3).

Pairwise comparisons were conducted evaluating the difference in ratings between SCENES for participants who viewed same-SCENES pairs. The sample size for each pairwise comparison varied from 15 to 32 (average n per comparison = 21) due to random assignment of participants to view three of the nine SCENES each (ns for each comparison are noted in Table 2). These comparisons (using a conservative Bonferroni corrected alpha of 0.05/8 = 0.00625) revealed that for 53% of the comparisons the differences in criticalness ratings between scenes were significant. More importantly given the small sample sizes across pairwise comparisons, 75% of these comparisons yielded medium to large effect sizes (Cohen's d; see Table 2). Moreover, in instances where SCENES did not differ significantly in criticalness ratings, the non-significant differences were observed between scenes that were scripted to reflect similar degrees of criticalness (e.g., Scene 1 vs. 2; Scene 3 vs. Scenes 4a, 4b, and 4c; Scene 6 vs. Scene 7).

The three clips (scene 4a, 4b, & 4c) that were scripted to represent scenes with different configurations of *neutral* social feedback yielded similar ratings (Ms range from 5.38-5.66), though the effects size suggests that the configuration of actors in scene 4c may be perceived as more critical than in scene 4a: $t(17) = 2.22$, p = 0.04, d =0.68. In addition, the ratings for scene 3

(M = 5.27, SD = 1.89) suggested that it reflected similar emotional content in comparison to scenes 4a-4c (all ps >0.07). Further, it is important to note that although the assigned script for scene 5 (M = 6.61, SD = 1.62) was intended to capture an audience that was depicting *less* critical social feedback than scene 6 (M = 6.55, SD = 1.77), the effects size suggests that these scenes may reflect emotional differences in the opposite direction than intended (i.e., scene 5 was rated as more critical than scene 6, $t(21) = 2.35$, $p = 0.029$, d =0.55)).

4.) Discussion

The goal of this paper was to introduce a structured set of dynamic social clips (i.e., SCENES) that are freely available to researchers for use in social cognition studies. The SCENES each include 10 actors portraying a social situation that is highly relevant to research focused on the impact of social evaluation (i.e., an audience). The intention was to generate audience configurations that differed on emotionality while holding other visual characteristics constant (e.g., the setting, lighting, actors, actor positioning). The study results provide evidence from a large sample of adult raters that the SCENES reflect varying intensities of critical feedback, as intended. That is, generally speaking the intensity of criticalness ratings increased from scene 1 to scene 7 (see Table 2; Figure 3). Despite that the difference in ratings between SCENES did not always reach statistical significance, the pattern of medium and large effect sizes between the SCENES that were scripted to represent different degrees of emotionality suggests that the stimuli successfully capture a range of criticalness in a dynamic audience. Of note, there were instances in this stimuli set for which the SCENES did not meaningfully differ from one another in the intended way (i.e., scene 3 vs. scenes 4a, 4b, and 4c; and scene 5 vs. 6). That said, we have included all of the SCENES in this stimulus set because we anticipate that one configuration of emotional feedback may be more or less optimal than another for different

research questions. For example, although in the current study scene 3 does not differ from the neutral scenes in terms of criticalness ratings, it *does* differ in the scripts that actors are following throughout the video. In this way, researchers are able to evaluate each option and determine which of the SCENES may be best suited to the specifics of their project.

Engaging with and evaluating the social world involves negotiating dynamic situations that consist of both verbal and non-verbal feedback, as well as both facial expressions and body language. Given that fear of public speaking is a common, and in some cases debilitating, social concern, these stimuli enable a variety of compelling approaches to social cognition research. In particular, we see at least three potential implementations of these stimuli in future research.

First, given that data from this validation study suggest that the stimuli range in the intensity of the critical feedback they depict, different clips may be used as independent variables to systematically evaluate the impact of the intensity of social threat on various outcomes of interest (e.g., neurological, physiological, and/or psychological responses) in order to the help understand processes that buffer versus promote anxious responding in the social world. Second, given that for each clip all actors are assigned emotional responses that stay consistent across the clip, researchers may identify different actors/emotions within the clips as independent variables in order to evaluate visual attention to specific types of social feedback (e.g., vigilance to critical audience members). Third, these clips may be particularly useful in studies designed to provide participants with standardized social feedback, including tasks such as the Trier Social Threat task and behavioral approach tasks. Related to the scientific value of this standardized social feedback is the potential clinical utility of these clips for exposure therapy in the treatment of social anxiety disorder and fear of public speaking.

As with any stimuli designed to strike a balance between internal and external validity, there are advantages and disadvantages to this set. First, particularly for the second line of work described above, there may be meaningful variability between actors in characteristics that impact social cognition *other than* their emotional content; this is including but not limited to actor's clothing, acting ability, and attractiveness. Similarly, as the SCENES intentionally differ in their emotional content, there are meaningful differences between SCENES in non-verbal behaviors such as eye contact, movement, and posture. Although these differences are a natural byproduct of the intended variability in emotionality, we note them here because they may represent confounds when conducting systematic comparisons between SCENES. Further, despite the strengths of these scripted dynamic clips, these stimuli still remain artificial in various ways. That is, the actors are not genuinely interacting with the observer (participant), and thus they cannot capture the natural reciprocity inherent in social situations. And lastly, although the limited diversity among the actors (i.e., they are all Caucasian young adults) may promote internal validity, it is important to note that this homogeneity places meaningful limits upon the generalizability of these stimuli to the diverse social world. An added consideration related to the lack of diversity among actors is that the SCENES may be experienced differently among people of different social groups (of note, although criticalness ratings did not differ between White participants and participants of color in the current study, the limited diversity in our sample precluded a detailed investigation of potential differences between specific racial identities). For example, in light of evidence that humans have prepared fear responses to racial out-group members (Olsson et al., 2005) this audience may be experienced as more threatening to some participants of color as compared to White participants, further underscoring the importance of developing stimuli that reflect greater actor diversity. In summary, future work should assess the

perceived believability or authenticity of the audience as well as broaden the SCENES database to include stimuli that capture greater diversity. In addition, replication of these validity data in independent samples using instruments with established psychometric properties is essential to confirming the reliability and validity of these ratings.

To date, the bulk of scientific work that has evaluated the cognitive processing of social information has relied upon stimuli that are arguably limited in their ability to capture the nature of these processes in one's social life. One reason for this may be the absence of structured dynamic stimuli that capture representative social situations. The results presented herein suggest that the SCENES capture a range of critical feedback, and as such these stimuli provide a resource to researchers interested in conducting studies that promote generalizability of results to the social world.

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