

**Do Facial Expressions of Emotion Modulate One's Decision to  
Engage in an Object Handover Task?**

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April

2025

FACIAL EXPRESSIONS OF EMOTION AND WILLINGNESS TO ENGAGE

**Do Facial Expressions of Emotion Modulate One's Decision to Engage in an Object  
Handover Task?**

An Honours Thesis Submitted to the Department of Human Kinetics In Partial Fulfillment of the  
Requirements for the Degree of Bachelor of Science in Human Kinetics with Honours

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April 2025

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## Abstract

This study investigated whether facial expressions of emotion influence willingness to engage in a simple object handover task. Participants ( $N = 30$ ) viewed images varying in emotion (angry, happy, neutral, sad), sex (female and male), and race (Asian, Black, Hispanic, White), and rated their willingness to engage based on an instructed prompt for the action (give, take) and object (knife, spoon).

A repeated-measures ANOVA revealed significant main effects of Emotion  $F(3, 29) = 24.65, p \leq 0.001, \eta_p^2 = 0.46$ , Sex  $F(1, 29) = 11.45, p = 0.002, \eta_p^2 = 0.28$ , Race  $F(3, 29) = 5.74, p = 0.003, \eta_p^2 = 0.17$ , Action  $F(1, 29) = 8.88, p = 0.006, \eta_p^2 = 0.23$ , and Object  $F(1, 29) = 32.14, p \leq 0.001, \eta_p^2 = 0.53$ . Holm-corrected post hoc comparisons showed that angry faces received significantly lower engagement ratings than all other emotional expressions ( $p \leq 0.001$ ), and happy faces were rated significantly higher than sad and neutral expressions ( $p \leq 0.01$ ).

A significant Emotion X Action interaction,  $F(3, 87) = 3.64, p = 0.016, \eta_p^2 = 0.11$ , indicated that giving actions paired with happy or neutral expressions were rated more positively than taking actions ( $p \leq 0.05$ ). The Emotion X Action X Object interaction was also significant  $F(3, 87) = 0.15, p \leq 0.001, \eta_p^2 = 0.01$ . Follow-up tests revealed highest engagement for the Happy Give Spoon combination ( $p \leq 0.001$ ), and lowest for Angry Take Knife ( $p \leq 0.001$ ).

These findings suggest that facial expressions of emotion as well as social context modulate one's decisions to engage in a sociomotor task.

**Key Words: Decision making, facial emotion, giver-taker roles, sociomotor task**

### **Acknowledgements**

I would like to sincerely thank my supervisor, Dr. Melanie Lam, for her exceptional mentorship, guidance, and support throughout this project. She has pushed me to grow as both a student and a researcher, none of this would have been possible without her contributions. I am also grateful to my second reader, Dr. Ryan Reid, for his valuable insights and contributions to this work. Thank you to the participants who took the time to be involved in this study making this research possible. To my lab mate and good friend, Lauren Clark, thank you for being such an uplifting and motivating presence, your support and charisma kept me going through this entire process. To my parents, thank you for your unwavering love, encouragement, and belief in me. When I was at my lowest you kept me going, for that I am eternally grateful. Your support means more than I can put into words. And to my brother and sister, thank you for always cheering me on, I'm lucky to have you both in my corner. Lastly, I want to thank the Department of Human Kinetics at St. Francis Xavier University for the opportunity to pursue this research and for creating such a supportive and enriching academic environment throughout my undergraduate studies.

## **Introduction**

Humans are social beings who use various ways to communicate information, including verbal and nonverbal. One integral communication method is the expression of emotion. Emotion is important when interacting with others (Tooby & Cosmides, 1990). For example, if you are working on a puzzle with someone displaying happy facial expressions such as a smile or raised eyebrows, the task will be enjoyable for you, and you will have a sense of togetherness (Michael, 2011). In contrast, if you are completing the puzzle with someone displaying angry expressions such as intense eye contact or furrowed brows, you might feel uncomfortable and have difficulty focusing on the task because you wonder if you have done something to upset the person (Michael, 2011).

The way emotion is expressed and perceived may heavily influence social interactions. The examples above show how positive emotions, such as happiness, elicited a more enjoyable and cohesive interaction. In contrast, expressing negative emotions like anger creates uncomfortable and difficult interactions. However, there are also situations where happiness can be less valuable, and anger can be of value. For instance, overexpression of happiness can lead to distraction or insensitive responses. In contrast, appropriate expression of anger can address conflict or induce motivation toward completing the task (An et al., 2017; Campellone & Kring, 2013).

Behaviour has been examined by measuring performance variables such as reaction times and kinematics of movements in joint action tasks, which is the coordination of movement between two or more people in space and time (Sebanz et al., 2006). However, a review by Bienkiewicz et al. (2021) has raised concern that emotion is not being considered in joint action literature. Before the impact of emotion on behaviour in a socio-motor task can be examined, it is necessary to understand how it affects decision-making. Thus, this study will explore how emotion influences

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decision-making in a socio-motor task, specifically how facial expressions modulate one's decision to engage in an object handover task.

## Literature Review

### *The History of Emotion*

Throughout evolution, the use of emotion has been pivotal for our ancestors. Emotion has provided the capacity to detect and respond to different surrounding dangers to survive (Tooby & Cosmides, 1990). For example, if a clan member expressed a look of fear, it served to alert those around them of the potential threat of danger. This gave the clan enough time to prepare to flee or fight, a key survival mechanism (Prinz, 2004). Happy expression strengthens clan bonding, decreases group aggression, and increases survival against hostile clans. This allows for trust between individuals, improving group cohesiveness, which is advantageous for tasks such as hunting (Bailey et al., 2013). Being able to express and interpret different types of emotion has played an important role in human evolution. Those who did not develop such the ability to perceive and interpret emotion had a decreased chance of survival and, in turn, could not procreate (LeDoux, 2012). This is a key example of survival of the fittest and how our ancestors used emotions such as happiness and fear to evolve.

Prinz (2004) proposes two major frameworks for understanding emotion from an evolutionary perspective. One involves understanding emotion as a process of natural selection, and the other is that emotions are socially constructed. The evolutionary view claims that emotions evolved adaptations to serve our ancestors. In support of the evolutionary view, Prinz (2004) uses an example of sneezing and how it is an innate reflex amongst us all that cannot be learnt, likewise for emotion. On the other hand, the social constructionism view argues that emotion is socially constructed. Cultural variation is the main supporting evidence for this framework (Prinz, 2004). An example of social constructionism is in Inuit culture, where anger is viewed as a risky emotion to use. Since anger is rarely displayed, it is perceived as risky and can negatively impact group

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cohesiveness. Group cohesiveness is culturally significant to the Inuit people, especially in harsh living conditions (Prinz, 2004). Ten Houten (2021) offers support for both frameworks using Plutchik's categorization of behaviours and emotions which arose in response to four problems of life: "identity, temporality, hierarchy, and territoriality" (TenHouten, 2021, p. 610). There is also a discussion of the social constructionist theory in support of the view of social constructionism. With the help of these models, it is demonstrated how emotions have served an evolutionary role for our ancestors and that the expression of emotion and its interpretation leading to behaviour is heavily influenced by one's culture, which is a social construct (TenHouten, 2021).

### ***What is Emotion?***

Emotion is defined as a functional state of the brain that varies depending on one's situation (Adolphs et al., 2019). This means emotions serve a purpose and are not simply feelings we experience. This perspective highlights how emotion can serve us in many ways, such as making decisions, guiding behaviour, increasing survival, communicating, or accomplishing a goal. Emotion occurs in response to our interpretation of different stimuli or situations (Adolphs et al., 2019). Intense emotions can evoke cognitive, expressive, physiological and behavioural changes in our bodies (Cabanac, 2002). For example, if you find yourself in a dangerous situation, your body will have a physiological response, releasing adrenaline and increasing your heart rate. Our bodies will go from a relaxed, slumped posture to an upright, tense one, preparing to fight or flee at any moment (Phelps & LeDoux, 2005).

Six universal emotions have been identified: anger, fear, surprise, sadness, disgust and happiness. They proved that people from widely differing cultures can agree in their interpretation of facial emotion and expression (Ekman & Friesen, 1971). We can express negative emotions

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(i.e. anger, disgust, sadness), neutral emotions and positive emotions (i.e. happiness) (Silverman, 2015).

Everyone experiences emotion. Classifying emotion as a functional state illustrates its role in shaping our thoughts and how it affects how we interpret and respond to the world around us. Cabanac (2002) proposes that emotion is “any mental experience with high intensity and high hedonic (pleasure/displeasure) content” (Cabanac, 2002, p.69). A four-dimensional model of consciousness previously defined by Cabanac (1996) is used to determine how it applies to emotion. The four dimensions consist of quality, intensity, hedonicity, and duration. Quality speaks to the emotion experienced, such as joy, fear or sadness. It distinguishes one emotion from another based on what is felt, often a subjective experience. Intensity is the magnitude of the emotional thought or event, meaning how strongly or weakly it is felt. Hedonicity is the idea that emotions can be pleasant, unpleasant or indifferent and can be distinguished that way. Finally, duration is whether the emotion is short or long-lived. Some emotions last for seconds, and some persist over long periods, which affect one’s long-term mood or behaviour. Together, these four dimensions aid in explaining the complexity of emotions and their experiences. Cabanac’s (2002) model incorporates the concept that emotion is multidimensional and shares a cognitive or neurological origin among certain mental experiences, even though they may result in distinct mental states or behaviours.

### ***How Do Humans Recognize and Identify Emotion?***

Emotion is processed in many areas of the brain. One of the key structures associated with emotion processing is an area in the limbic system called the amygdala. It has an important role in fear conditioning and its evolution to other emotional states. The amygdala is said to have a role in emotional processing, including “implicit emotional learning and memory, emotional

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modulation of memory, emotional influences on attention and perception, emotion and social behaviour, and emotion inhibition and regulation” (Phelps & LeDoux, 2005, p. 175). An emotional face-viewing task to evoke emotion processing was studied (Silverman, 2015). Brain activation in the amygdala was measured by showing participants images of different socioemotional cues (Silverman, 2015). Healthy controls (HC) were compared to participants with borderline personality disorder (BPD), as individuals with BPD have heightened emotional sensitivity. Two conditions using images of facial expressions occurred: (1) a masked condition of fear processing and (2) an unmarked condition. During the whole brain analysis, they found that facial expressions eliciting fear in participants showed greater activation in the amygdala of HC relative to the participants with BPD in the masked fear processing condition. This finding shows both activation of the amygdala during fear processing and that different groups of individuals have their levels of sensitivity in response to fear cues at an unconscious level (Silverman, 2015).

As described, emotions can be physically expressed through the body and the face (Alexandrov & Sams, 2005). For this study, only facial expressions of emotion will be reviewed. Our facial muscles are innervated by the VII<sup>th</sup> nerve through our brains, in which voluntary and involuntary facial movements occur under the control of differing neural tracts (Matsumoto & Ekman, 2008). Our facial movements are specialized for expression (Matsumoto & Ekman, 2008). Ekman and Friesen (1978) developed a coding system called the facial action coding system (FACS) to categorize and analyze facial movements based on muscle actions that are involved in expression (Wolf, 2015). FACS has been used to analyze facial expressions for basic emotions, as provided by Ekman and Friesen (1971). This system has also identified action units (AUs) that capture how the muscles move, and which muscles are activated (Matsumoto & Ekman, 2008). These technological advancements have helped us research the complexities in both the expression

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and interpretation of emotion in humans. As shown, many processes are involved in human emotion recognition, and they must all work together to succeed.

### *Facial Expressions of Emotion*

When certain muscles and features of the face are moved, it provides emotion recognition (Wegrzyn, 2017). Darwin's work (1872) was one of the first used to link facial expressions with emotion. van Kleef and Cote (2022) found that facial expressions offer external clues suggesting the emotional state of the expresser. For example, happiness indicates a positive internal state with an expression of wrinkles around the eyes and raised corners at the mouth, producing a smile (Wegrzyn et al., 2017). In contrast, sadness indicates a negative internal state with an expression of dropped corners of the mouth and raising of the inner eyebrows (Matsumoto & Ekman, 2008). Studies have examined facial expression and its effect on communication. An et al. (2017) examined how participants feel and think when identifying positive and negative emotions through facial expressions. Using a mixed-participant design, they recruited participants from four cultures (South Korea, China, Canada and the US). The six universal emotions were used in their study to answer two questions measuring the affective (how they feel) and cognitive (how they think) positivity and negativity of each emotion on a scale from 0 (not at all) to 6 (extremely). The questions were randomly presented. An example of the affective positivity question using sadness as the studied emotion was "How positive does experiencing sadness feel to you?" with the cognitive positivity question being "Overall, how positive do you think experiencing the emotion of sadness is?" (An et al., 2017, p. 4). An example of the affective negativity question for sadness was "How bad do you feel when you are feeling sad?" and cognitive negativity, "To what extent do you think the emotion of sadness is negative?" (An et al., 2017, p. 4). The results showed a significant difference between cultures in terms of affective (how they feel about the emotions)

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and perception of the positive and negative valence of emotions. However, there were no significant differences in cognitive responses. This implies that despite differences in how they feel about the emotion and perceive and react to it (valence), all four cultures assessed facial expressions of emotions similarly for thought-based judgements. This means that each facial emotion contained some degree of positivity and negativity that all participants could identify.

Ekman and Friesen challenged the narrative that our facial expressions were determined solely by social factors. They recruited subjects without experience with Western culture and some who did. They showed participants 3 images of faces simultaneously and read a story, then asked them to point to the image of the face that best corresponded with the emotion described in that story. Stories were given for six emotions (anger, fear, surprise, sadness, disgust and happiness). The results indicated no significant difference between the most and least Westernized participants. This finding gave rise to increased interest in research on facial emotion, especially in the context of psychiatric disorders such as schizophrenia (Gao et al., 2021), autism (Black et al., 2017), and major depressive disorder (Anderson et al., 2011). Facial emotions are understood to facilitate daily social coordination and cooperation (van Kleef & Cote, 2022).

### ***Bodily Expressions of Emotion***

Research on bodily expression has received more attention because it influences decision-making (Van den Stock et al., 2007). Bodily emotion is expressed using our gestures and movements (Witkower et al., 2021). It offers insight into our emotional state and is used across many cultures to express emotions (Witkower & Tracy, 2018). For example, if someone is skipping towards you with a good posture, you can assume that person is in a good mood. Someone slouched and walking very slowly with their head down shows they are upset. It is easier to notice bodily expressions from afar, allowing us to focus on the internal state being expressed (Witkower

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& Tracy, 2018). These internal states are guided by our emotions and affect the movements we perform using our bodies (Van den Stock et al., 2007). While bodily expressions of emotion are believed to be as important as facial expressions of emotion for communication (see Witkower & Tracy, 2018), we will focus our attention on facial emotion for this study.

### ***Facial Emotion and Communication***

Facial emotions communicate information to the other without any verbal communication required. It has been shown that emotion guides us through social situations and triggers the use of inferential processes (van Kleef & Côté, 2022). van Kleef and Côté (2022) describe inferential processes as the cognitive processing of information that allows us to make assumptions about people and situations based on emotional expressions. In a joint action context, this information is valuable as it allows you to approach the situation with your partner accordingly without even having to talk (Horstmann, 2003). If someone is sad, I would process that information and take the more difficult task, leaving the easier one for my partner to accomplish. However, if I were working with a happy partner, it would not have crossed my mind to do the harder task in hopes of increasing the chances of a more successful outcome.

If you want to carry out a task that requires your friend's help (e.g., asking a friend to move a table with you), your emotional state could benefit or harm the outcome. The idea that emotions offer social information which serves humans at the interpersonal level was not considered. van Kleef (2010) was one of the first to offer insight into this matter. He asked, "If emotions were only functional at the individual level, why would they show on our faces?" (van Kleef, 2010, p. 331) This question sparked a new direction in the study of emotions. Interpretation of facial emotion is extremely valuable for joint action as it allows for better coordination throughout a task (Willis et al., 2013). On top of this, it gives you an idea of how to appropriately approach the task, starting

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you off much more efficiently than had you not interpreted your partner's facial emotions (van Kleef, 2010).

### ***Does Own Race Impact the Processing of Facial Emotion of Other Races?***

Although there are many emotions and ways to express them, the six universal emotions aid immensely in a few basic facial expressions that can be identified universally (Horstmann, 2003). These emotions allow individuals to appropriately categorize the expressed emotion, improving social interactions despite differences in display rules (Horstmann, 2003). Emotions tend to occur after an event, usually social. One's upbringing, social norms, status, personality, and culture greatly influence differences in the appropriateness of emotional expressions after an event. Society heavily influences these factors, and display rule is a term used to describe these differences in expressions. Display rules are what we view as appropriate to express in social contexts, and this varies among individuals (Ekman, 1993). What one person may perceive as appropriate, another may deem inappropriate. Examples include how one displays joy at a birthday or grief at a funeral. Another can be how some cultures do not accept women acting out in public (e.g., showing anger or aggression) or men expressing fear or emotions that involve tears (Rostomyan, 2024). Display rules greatly influence human behaviour and how people intensify, minimize, or completely suppress their emotions (Kamiloglu et al., 2024). Differences in the interpretation of expressions will influence the observer's behavioural response, eliciting a positive or negative response when participating in joint action tasks with differing individuals (van Kleef & Cote, 2022).

### ***Facial Emotion and Decision Making***

Researchers have made considerable progress in our understanding of how facial emotion can impact decision making, and a study by Willis et al. (2011) aimed to examine how expressions

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of emotion displayed by both the face and body influence one's decision to approach or avoid someone. Expressions of anger, happiness and naturalness were shown to participants and using a Likert scale, they rated if they would approach this person or not. The findings found that expression of happiness had higher ratings of approachability, whereas neutral and angry had lower ones and could make extremely fast decisions when perceiving facial emotions (Willis et al., 2011). Expression of anger had the lowest ratings of approachability as it indicates a direct threat to the observer (Willis et al., 2011). These findings are important as they reveal how expression of facial emotion shapes our rapid and instinctive decisions, affecting our safety and interpersonal relationships.

Another study done by Campellone and Kring (2013) examined how facial emotion shapes one's decision about someone's trustworthiness. Participants played a trust game with simulated players whose facial emotions were either happy or angry. After the game was completed, participants were asked to invest points in the simulated player they were paired with. They found that facial emotion greatly impacted whether participants found the simulated player trustworthy (Campellone & Kring, 2013). The findings of Campellone and Kring (2013) are significant because they highlight the critical role of facial emotions in shaping trust-related decision-making, with broader implications for social interactions.

### ***The Influence of Facial Emotion on Social Interactions***

When thinking about expressing emotions this way, we can appreciate how much our emotions shape our interactions with others daily. Take a moment to think about a recent interaction you had with a friend. Did you approach them openly, smiling while holding eye contact? Or perhaps your body was closed off, and you timidly looked down at the floor, pouting while approaching them. In the first scenario, you might be perceived as being in a good mood and

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approachable. In the second scenario, however, your friend might assume you are upset, making them less willing to approach you. This will change how your friend interacts with you depending on how they approach the situation when they read your emotional expression (Willis et al., 2013).

Researchers have examined the influence that facial emotions have on social interaction. Montepare and Dobish (2003) explored how facial emotion influenced participants' impressions of someone. Different facial expressions were displayed, and participants rated them using 16 trait adjectives. They found that happy and surprised facial expressions elicited positive trait impressions with confidence and friendliness. Anger also had high ratings for confidence but low ratings for friendliness (Montepare & Dobish, 2003). This finding shows that facial expressions of emotion do influence your influence on someone. Another study by Marsh et al. (2005) examined how facial expressions of fear and anger affect approach and avoidance behaviours. In the first block of trials, participants viewed faces expressing fear or anger and were asked to pull the lever for fear and push the lever in for anger. A second block consisted of trials doing the opposite task (pulling the lever for anger and pushing the lever for fear). The results showed that anger encouraged avoidance (faster push lever responses) while fear encouraged approach behaviour (faster pull lever responses) (Marsh et al., 2005). These studies show the significant role of facial emotion in social interactions and how one will engage in these interactions depending on the expressed emotion.

### ***Dyads Interacting in a Shared Motor Task***

Joint action is the movement coordination between two or more people in space and time (Sebanz et al., 2006). A study was conducted to test the idea that shared representation is necessary to engage in joint action. Sebanz et al. (2003) modified the Simon task so that two people could share it. Each participant had to respond to a stimulus feature (red or green ring) on the index finger

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that pointed to the left of the right. Participants were each assigned a response button. A finger that pointed away from the participant was considered an incompatible trial, and when it pointed toward the participant, it was considered a compatible trial. The go-nogo Simon task was done individually; this meant they had to complete just one-half of the Simon task alone. The joint Simon task was completed in a dyad; each participant was responsible for responding to a specific stimulus feature. The third task was the completion of the original Simon task.

Their results showed no Simon effect in the first condition. The argument was that there was no competition for responses since participants were only assigned one stimulus and one response. Interestingly, they found a joint Simon task in the second condition, supporting the argument that participants were co-representing. As anticipated, they found a typical Simon effect in the third condition. In a subsequent paper, Sebanz et al. (2006) made the case that successful joint action depends on three abilities. These include the ability to: (1) share representations, (2) predict actions, and (3) integrate predicted effects of one's own and others' actions.

## **Purpose and Hypotheses**

The literature review demonstrated that there has been lots of research concerning joint action tasks. However, almost all of them focused on behaviour. Bieńkiewicz et al. (2021) acknowledged a gap in the joint action literature. She highlighted a failure to recognize that humans are not just social beings but also emotional ones and the need to consider facial emotion in a socio-motor task.

This experiment explored the impact of facial emotion on decision-making in a socio-motor task. Lam et al. (2024) explored the influence of facial emotion through point-light displays on the willingness to give or take a utensil (spoon, knife). They showed that the object used in the task influenced the decision-making process and that the relationship between the object and action influenced one's willingness to engage in a handover task. They also found that the decision to engage in a handover task was not influenced by the bodily emotion expressed by the point light display. Pictures from the RADIATE stimulus set were presented to determine if the static image of facial expressions modulates willingness ratings. This stimulus set is unique as it allowed us to explore how race might also factor into these ratings. Participants were asked to imagine engaging in an object handover task. An object handover task is the passing of an object to another person using a manual or hand action. We hypothesized that sad and angry facial emotions (negative) would have the lowest engagement ratings. And that happy facial emotions (positive) would have the highest engagement ratings, with neutral facial emotions having engagement ratings fall somewhere between positive and negative emotions.

## Methods

### *Participants*

Thirty undergraduate students participated in the study (24 females, 6 males;  $M = 21.1$ ,  $SD = 1.7$  years). Recruitment was done through word of mouth and email. Before completing the study, participants were emailed three documents: an Invitation to Participate (Appendix A), a Consent form (see Appendix B), and a Self-Report Measures form (Appendix C). They were made aware that they must have normal to corrected-to-normal vision with no neurological, intellectual, developmental, or physical disabilities that might affect their participation in the study. Participants answered no to the following criteria: 1) Do you have any conditions that will affect your mood? (e.g., bipolar disorder) 2) Do you have any conditions that will affect your ability to pay attention for 20 to 30 minutes? 3) Do you have any conditions that will impact your ability to sit at a computer for 20 to 30 minutes? (e.g., back pain) 4) Do you have any conditions that will impact your manual dexterity? (e.g., carpal tunnel) (Appendix C). Participants were told that they must also have access to a computer with a Windows operating system to complete the experiment, or they would have to complete it in the Perceptual-Motor Lab at St. Francis Xavier University (StFX). Participants were incentivized by being told they would be entered to win a \$50 gift card for completing the study. Approval for this research was obtained from the Research Ethics Board (REB) at StFX.

### *Apparatus and Materials*

The Racially Diverse Affective Expression (RADIATE) stimulus set was used (Conley et al., 2018). It was designed to study emotional expression across different races and ethnicities. It has factored in age, gender, race, amount, and overall quality of the stimuli. Previous stimulus sets have been predominantly pictures of white faces. The RADIATE stimulus set has been tested

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for validity and reliability and has a high mean accuracy (70% or higher) for each race and emotion category (Conley et al., 2018). There are 1721 photographs in the RADIATE stimulus set, which consists of 109 adult faces (56 females and 53 males). They ranged in age from 18 to 30 years old. Eight facial expressions of emotion are presented: angry, calm, disgusted, fearful, neutral, sad, and surprised, with open and closed-mouth variants. The images are presented both in colour and black and white. The different races used in this study were Asian ( $n = 22$ ), Black/African American ( $n = 38$ ), Caucasian ( $n = 28$ ), Hispanic or Latino ( $n = 20$ ).

E-Prime Studio was the software tool used to build the experiment. E-Prime Go generated a link to the experiment, which was distributed to participants and securely stored the data. The E-Run application opened all the experimental design ability test (EDAT) files downloaded from the E-Prime Go website.

### *Procedures*

Participants completed the screening process and emailed the experimenter if they could participate. Those eligible received another email with a link generated by E-Prime Go. This link allowed participants to download the experiment. They were asked to complete the experiment in a quiet, distraction-free environment. Once participants clicked the link, the experiment began. They were first provided with a general overview of the experiment and told how to exit it should they wish to withdraw from the experiment at any time.

There were five tasks: The first was identifying how the participant feels at the start of the testing session. They had eight options, each with its response key. If they were angry, they pressed A; if they were scared, they pressed S; if they were sad, they pressed D; if they were happy, they pressed F; if they were frustrated, they pressed G; if they were anxious, they pressed H if they were disappointed, they pressed J, and if they were calm, they pressed K. The second task was the

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Engagement Rating task. First, there was an instruction screen, on which the instructions were in black font on a white background. This was followed by the list of events in sequence. The order of events in any given trial was as follows: 1.) prompt (3000 ms), 2) fixation (1500 ms), 3) stimulus (2500 ms), and 4) rating screen (infinite).

The prompt was in black font on a white background; the fixation was a black plus sign (0.75 cm X 0.75 cm) on a white background, presented at the center of the screen for 1500 ms. Each image (11.5 cm X 11 cm) was displayed on a 19" Dell monitor with a white background. Four emotions were selected for this study: happy, sad, neutral, and angry. These emotions were chosen as they had high ratings of reliability and validity when categorizing emotion (Conley et al., 2018). Each stimulus shown expressed one of them, and participants would respond to the question using the corresponding keys on their keyboard. They were informed that a picture of a face would be shown and that their task was to respond based on the prompt at the beginning of the trial. The prompt display indicated the action (give, take) and the object (knife, spoon). They were asked to use their initial reaction (i.e., gut feeling) when selecting a response. They were informed that their partner was cooperative and was a willing participant in every case. The participants pressed the space bar to continue and were informed that they would complete two practice trials prior to the testing trials. This was done to familiarize themselves with the task requirements. Once finished, participants were informed that they completed the practice trials and were moving on to the test trials. An image of a face was shown, and their task was to make a rating based on the prompt at the beginning of the trial. They completed a "give or take" action for both a knife and spoon for all four emotions for males and females and each race. The prompt identified the action (give/take) and the object (knife/spoon) and asked the participant if they would engage in this scenario with this person. To answer this question, they would choose a rating

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using keys 1-7: 1 being definitely would not, 4 being no opinion/neutral, and 7 being most definitely not. They went through 128 engagement ratings (64 females and 64 males). Four emotions were used (anger, joy, sadness, neutral) for each of the four races (Asian, Black/African American, Hispanic, White).

For the third task, participants completed an Emotion Recognition task, Sex Recognition task and Race Recognition task. These tasks served as controls to ensure validity of the experiment. Participants were asked to identify the emotion, sex and race of the person presented. They would first complete the Emotion Control task with 32 samples (4 Emotion x 4 Race x 2 Sex). During this procedure, participants were asked to indicate the effect (emotion) of the face that was just shown to them using the keys 1-4 (1 being angry, 2 being happy, 3 being sad, 4 being neutral). After answering each of these questions, participants were asked to rate the confidence of their choice using the number keys “1” to “7” with “1” representing “not at all,” “4” representing “somewhat”, and “7” representing “extremely.” They were asked to indicate the sex of the face shown using keys 1 or 2 (i.e., 1 being female and 2 being male). This was followed by a confidence rating again but for sex identification. Next, they were asked to indicate the race of the face that was just shown above using keys 1-4 (i.e., 1 being Asian, 2 being Black, 3 being Hispanic and 4 being White). A confidence rating also followed this in their choice.

Once finished, participants completed the Object Classification Task. This task also served as a control to establish the participants’ perceived threat of the objects used. The same pictures of the objects used in the Engagement Rating task (knife and spoon) were presented. Participants were instructed to press the key corresponding to their classification of the object shown. The options were to press one of three number keys: “1” if they deemed the object dangerous, “2” if they deemed it neutral, and “3” if they deemed it safe. There was one trial for each object.

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The final component of the experiment required the participant to complete the Emotional Skills & Competence Questionnaire (ESCQ-45). The ESCQ-45 was a self-report measure of emotional intelligence (Takšić et al., 2009). It included three subscales of emotional intelligence (EI): the ability to 1) perceive and understand emotions, 2) accurately label and express emotions, and 3) manage and regulate emotions. The ESCQ-45 was a valid and reliable measure (Takšić et al., 2009) that assessed a person's EI level. EI is said to have six abilities, "emotion perception, emotion expression, emotion attention regulation, emotion understanding, emotion regulation of self, and emotion regulation of others" (Takšić et al., 2009, p. 162). This means that EI measured one's ability to recognize the emotions expressed by another individual and how they would solve problems in an emotional context. Participants were asked to answer the given claims immediately without much-given thought to assess problem solving in an emotional context by pressing one of the numbers on a Likert scale of 1 (never) to 5 (always). Upon completion of the experiment, participants received a thank you message and were asked to close the E-Prime test window. If they had further questions, they were asked to contact the primary investigator and were given the contact information. This study took approximately 30 minutes to complete from start to finish.

### *Data Analysis*

The statistical analysis we used when examining the Engagement Rating task was a five-way repeated measures analysis of variance (RM-ANOVA). The dependent measure was the mean engagement ratings. The within-subject factors included Emotion (i.e., sad, angry, neutral, happy), Sex (i.e., female, male), Race (i.e., Asian, Black, Hispanic, White), Action (i.e., give, take), and Object (i.e., spoon, knife). Alpha was set to 0.05. Mauchly's test was used to test the assumption of sphericity. If sphericity was violated, the values the Greenhouse-Geiser method provides were

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presented. Post hoc comparisons using Holm correction and simple effects tests were run when appropriate to isolate which factors significantly differed.

The Emotion Recognition task, the Sex Recognition task, and the Race Recognition task were analyzed by calculating the percentage of correct answers for each trial across all participants. This allowed us to determine whether participants could correctly identify the emotion, sex, and race of the face presented to them. Recognition scores for all images exceeded the chance level of 50%, allowing them to be included in the statistical analysis. The Object Classification task was analyzed according to their perceived threat. The classification for any object was determined by the highest percentage it receives.

The ESCQ-45 was analyzed by computing the averages of all statements belonging to a common set. Cronbach's alpha was used to determine the internal reliability of the sample. Just Another Statistical Program (JASP) (Version 0.17.3) was used for all statistical analyses.

## Results

**Engagement Rating Task.** A repeated-measures ANOVA was conducted on engagement ratings with five within-subjects factors: Emotion (angry, happy, neutral, sad), Sex (male, female), Race (Asian, Black, Hispanic, White), Action (give, take), and Object (knife, spoon).

**Main Effects.** The analysis revealed significant main effects of Emotion,  $F(3, 29) = 24.65, p \leq 0.001, n_p^2 = 0.46$ ; Sex,  $F(1, 29) = 11.45, p = 0.002, n_p^2 = 0.28$ ; Race,  $F(3, 29) = 5.74, p = 0.003, n_p^2 = 0.17$ ; Action,  $F(1, 29) = 8.88, p = 0.006, n_p^2 = 0.23$ ; and Object,  $F(1, 29) = 32.14, p \leq 0.001, n_p^2 = 0.53$ . Holm-corrected post hoc comparisons revealed that engagement ratings for angry expressions ( $M = 3.58, SD = 1.98$ ) were significantly lower than happy ( $M = 4.79, SD = 2.10$ ),  $t(29) = -5.92, p \leq 0.001$ ; neutral ( $M = 4.32, SD = 1.83$ ),  $t(29) = -4.67, p \leq 0.001$ ; and sad expressions ( $M = 4.06, SD = 1.89$ ),  $t(29) = -3.67, p = 0.001$ . Happy expressions were rated significantly higher than neutral,  $t(29) = 3.51, p = 0.001$ , and sad,  $t(29) = 4.12, p \leq 0.001$ . Neutral expressions were also rated significantly higher than sad expressions,  $t(29) = 2.79, p = 0.010$  (Figure 1).

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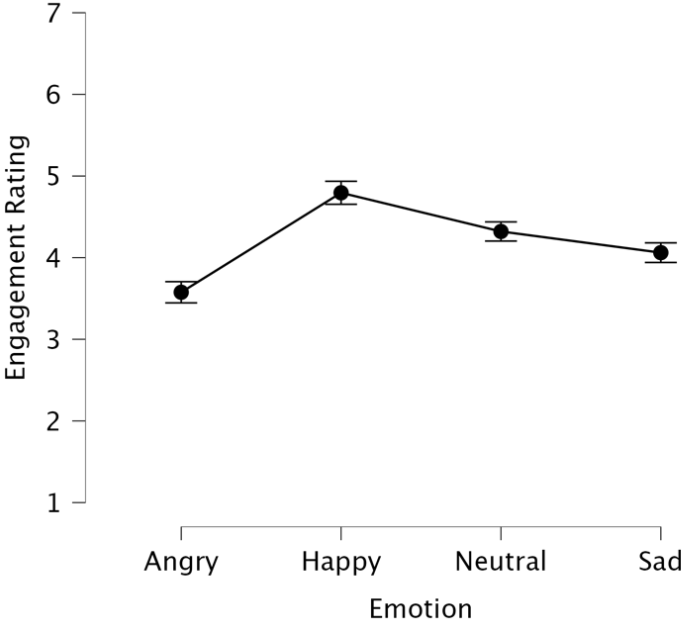


Figure 1. Mean engagement rating as a function of emotion. 95% confidence interval error bars are shown in this and all subsequent figures.

For Sex, female faces ( $M = 4.65, SD = 2.02$ ) received significantly higher ratings than male faces ( $M = 3.94, SD = 1.97, t(29) = 3.38, p = 0.002$  (Figure 2).

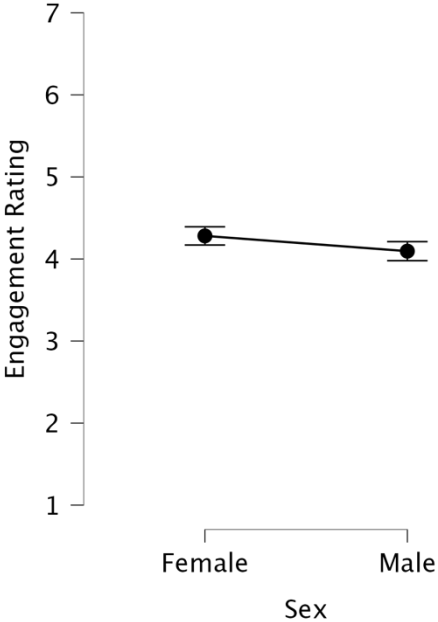


Figure 2. Mean engagement ratings as a function of sex

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For Race, Asian faces ( $M = 3.67$ ,  $SD = 1.84$ ) were rated significantly lower than Black ( $M = 4.54$ ,  $SD = 2.06$ ),  $t(29) = -2.79$ ,  $p = .012$ , and Hispanic faces ( $M = 4.75$ ,  $SD = 2.07$ ),  $t(29) = -2.39$ ,  $p = 0.026$ . No significant differences were found between Asian and White faces,  $t(29) = -0.47$ ,  $p = 0.644$ , or between Black and Hispanic faces,  $t(29) = -0.11$ ,  $p = 0.912$  (Figure 3).

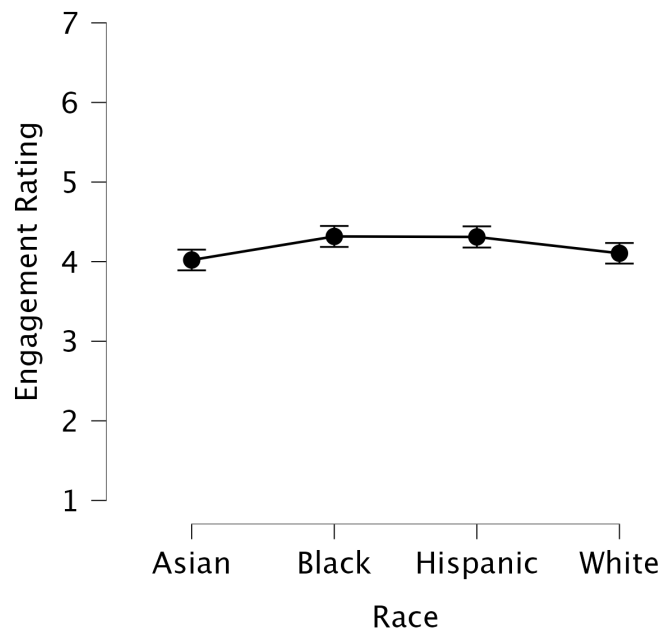


Figure 3. Mean engagement ratings as a function of race

For Action, give actions ( $M = 4.65$ ,  $SD = 2.08$ ) were rated more highly than take actions ( $M = 3.95$ ,  $SD = 1.98$ ),  $t(29) = 3.14$ ,  $p = 0.006$  (Figure 4).

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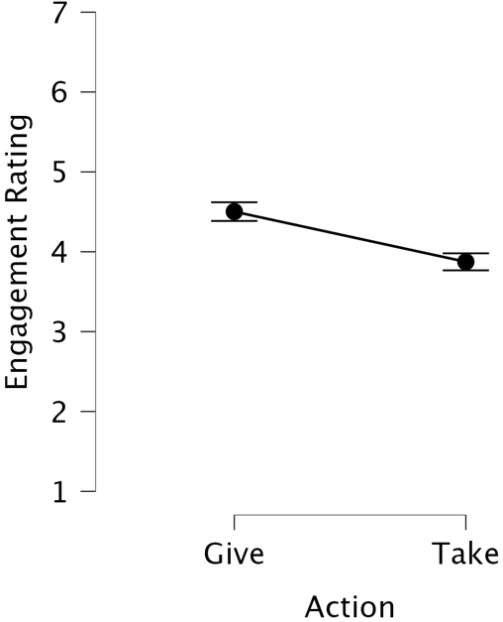


Figure 4. Mean engagement ratings as a function of action

Finally for Object, spoon conditions ( $M = 4.76, SD = 2.10$ ) were rated significantly more engaging than knife conditions ( $M = 3.84, SD = 1.92$ ),  $t(29) = 5.66, p \leq 0.001$ ; Figure 5).

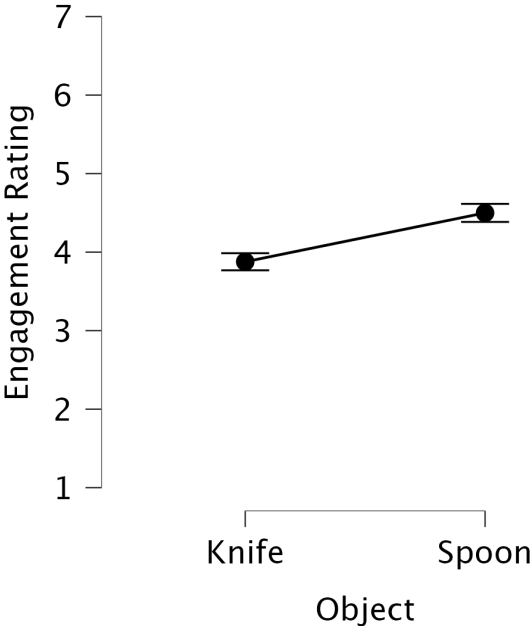


Figure 5. Mean engagement ratings as a function of object

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**Two-Way Interactions.** A significant Emotion X Race interaction was found,  $F(9, 29) = 3.27, p \leq 0.001, \eta_p^2 = 0.10$ . Simple effects analyses showed that angry expressions displayed by Asian faces ( $M = 2.91, SD = 1.69$ ) were rated significantly lower than angry expressions from Black ( $M = 3.63, SD = 2.00$ ),  $t(29) = -2.69, p = 0.012$ ; Hispanic ( $M = 3.78, SD = 2.13$ ),  $t(29) = -3.13, p = 0.003$ ; and White faces ( $M = 3.88, SD = 2.06$ ),  $t(29) = -3.61, p = 0.001$ . Across all racial groups, happy expressions consistently received higher engagement ratings than angry, neutral, and sad expressions. For instance, Hispanic-happy expressions ( $M = 5.22, SD = 2.03$ ) were rated higher than neutral ( $M = 4.40, SD = 1.78$ ),  $t(29) = 2.95, p = 0.007$ , and sad ( $M = 4.08, SD = 1.76$ ),  $t(29) = 3.36, p = 0.002$ . Asian-happy expressions ( $M = 4.76, SD = 2.10$ ) were rated higher than angry ( $M = 2.91, SD = 1.69$ ),  $t(29) = 5.62, p \leq 0.001$ ; neutral ( $M = 4.06, SD = 1.80$ ),  $t(29) = 2.22, p = 0.034$ ; and sad ( $M = 3.73, SD = 1.78$ ),  $t(29) = 2.47, p = 0.021$  (Figure 6).

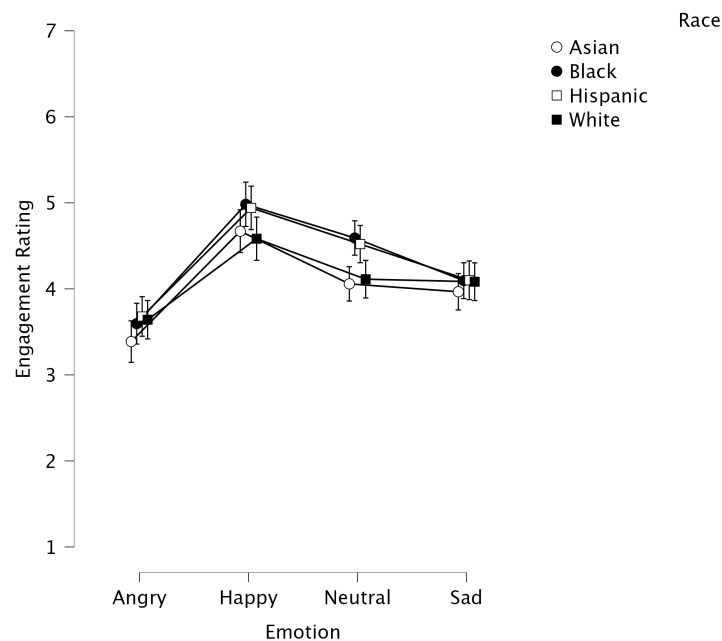


Figure 6. Mean engagement ratings as a function of emotion and race

A significant Emotion X Action interaction emerged,  $F(3, 29) = 16.11, p \leq 0.001, \eta_p^2 = 0.36$ . To further explore this interaction, post hoc comparisons were conducted. angry-give actions were

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rated significantly lower than happy-give,  $t(29) = -5.53, p \leq 0.001$ ; neutral-give,  $t(29) = -5.58, p \leq 0.001$ ; and sad-give,  $t(29) = -3.82, p = 0.001$ . Happy-give was rated significantly higher than all take conditions,  $t(29) = 3.97, p = 0.001$ , and was also higher than neutral-give,  $t(29) = 5.14, p \leq 0.001$ , and sad-give,  $t(29) = 2.76, p = 0.010$ . Neutral-give was rated significantly higher than sad-give and all take conditions, all ( $p \leq 0.05$ ), indicating that both the emotion and action jointly influenced engagement decisions (Figure 7).



Figure 7. Mean engagement ratings as a function of emotion and action

A significant Race X Action interaction was observed,  $F(3, 29) = 4.40, p = 0.006, \eta_p^2 = 0.13$ . Simple effects analyses indicated that give actions involving Asian faces ( $M = 3.67, SD = 1.84$ ) were rated significantly lower than those involving Black ( $M = 4.54, SD = 2.06$ ),  $t(29) = -2.79, p = 0.009$  and Hispanic faces ( $M = 4.75, SD = 2.07$ ),  $t(29) = -2.98, p = 0.004$ . Give actions involving both Black and Hispanic faces were rated significantly higher than their respective take actions Black-take, ( $M = 3.83, SD = 1.98$ ),  $t(29) = 2.81, p = 0.011$ ; Hispanic-take, ( $M = 4.06, SD$

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= 2.02),  $t(29) = 2.68, p = 0.015$ . Hispanic-give was also rated significantly higher than White-give ( $M = 4.12, SD = 2.00$ ),  $t(29) = 2.12, p = 0.046$  (Figure 8).

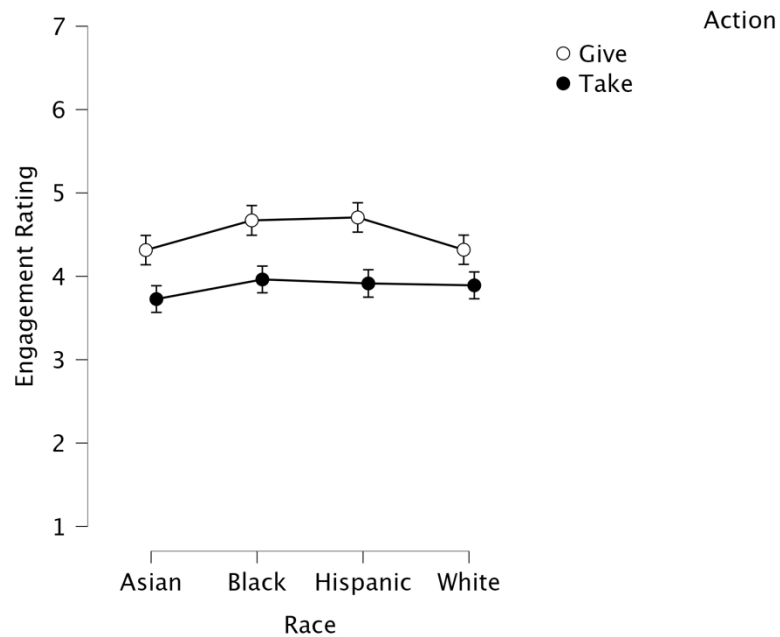


Figure 8. Mean engagement ratings as a function of race and action

Finally, a significant Action X Object interaction was found,  $F(1, 29) = 40.35, p \leq 0.001, n_p^2 = 0.58$ . Post hoc comparisons indicated that giving a knife ( $M = 3.22, SD = 1.77$ ) was rated significantly lower than giving a spoon ( $M = 5.19, SD = 2.11$ ),  $t(29) = -6.85, p \leq 0.001$ ; Taking a knife ( $M = 4.14, SD = 1.89$ ),  $t(29) = -4.69, p < .001$ ; and taking a spoon ( $M = 4.36, SD = 2.01$ ),  $t(29) = -5.17, p \leq 0.001$ . Giving a spoon was also rated higher than taking a spoon,  $t(29) = 2.90, p = 0.008$  (Figure 9).

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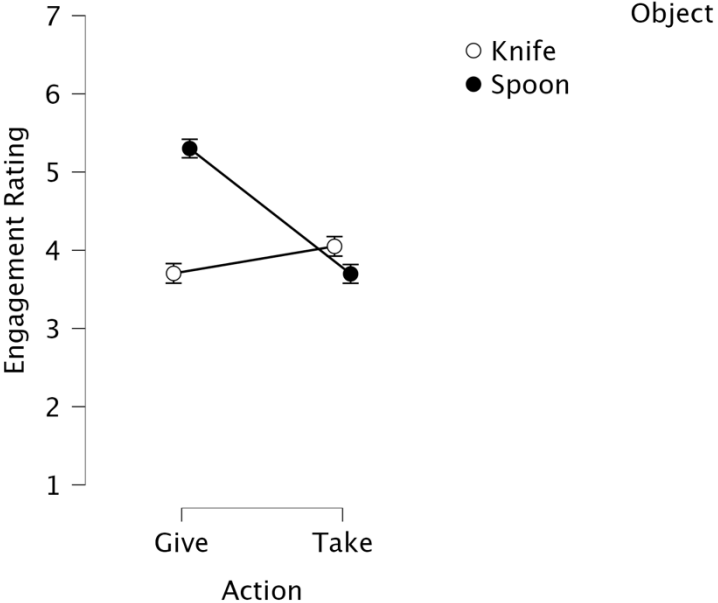


Figure 9. Mean engagement ratings as a function of action and object

**Three-Way Interactions.** A significant three-way interaction was found between Emotion X Sex X Race,  $F(9, 261) = 3.32, p \leq 0.001, \eta_p^2 = 0.10$ . Separate Sex X Race ANOVAs were performed for happy and neutral expressions. For happy expressions, the interaction was significant,  $F(3, 87) = 4.56, p = 0.005, \eta_p^2 = 0.14$ . Simple effects revealed that female faces were rated higher than male faces,  $F(1, 29) = 11.45, p = 0.002$ . A significant Race effect also emerged,  $F(3, 87) = 5.67, p = 0.001$ , with Asian female faces rated lower than Black and Hispanic, all ( $p \leq 0.02$ ), and White female faces rated higher than both Black and Hispanic, all ( $p \leq 0.02$ ). For neutral expressions, a similar pattern was observed between Sex X Race,  $F(3, 87) = 3.89, p = 0.011$  (Figure 10).

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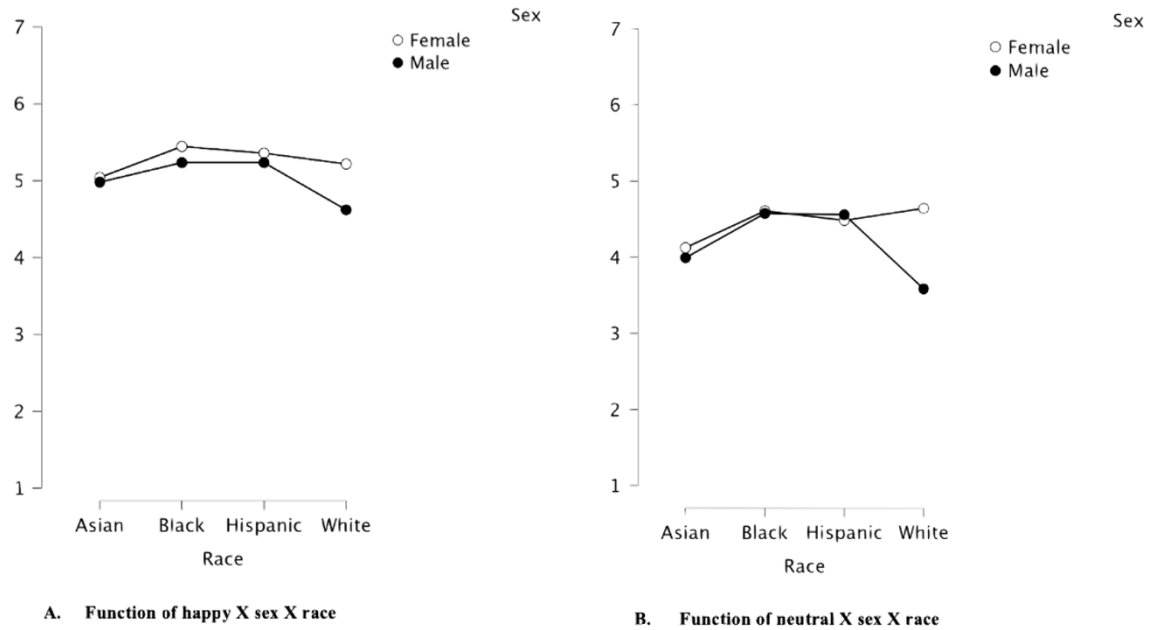


Figure 10. Mean engagement ratings

A significant three-way interaction was found between Emotion X Sex X Action,  $F(3, 87) = 2.87, p = 0.041, n_p^2 = 0.09$ . Follow-up analyses revealed a significant Sex X Action interaction for happy expressions,  $F(1, 29) = 7.45, p = 0.010, n_p^2 = 0.20$ . Simple effects showed that female-give actions were rated significantly higher than male-give,  $t(29) = 3.12, p = 0.004$ , and female-take,  $t(29) = 2.85, p = 0.008$ . For neutral expressions, the Sex X Action interaction was also significant,  $F(1, 29) = 5.89, p = 0.021, n_p^2 = 0.17$ , with female-give rated higher than both male-give,  $t(29) = 2.65, p = 0.013$ , and female-take,  $t(29) = 2.47, p = 0.019$ . No significant interactions were observed for angry or sad conditions all ( $p \geq 0.29$ ; Figure 11).

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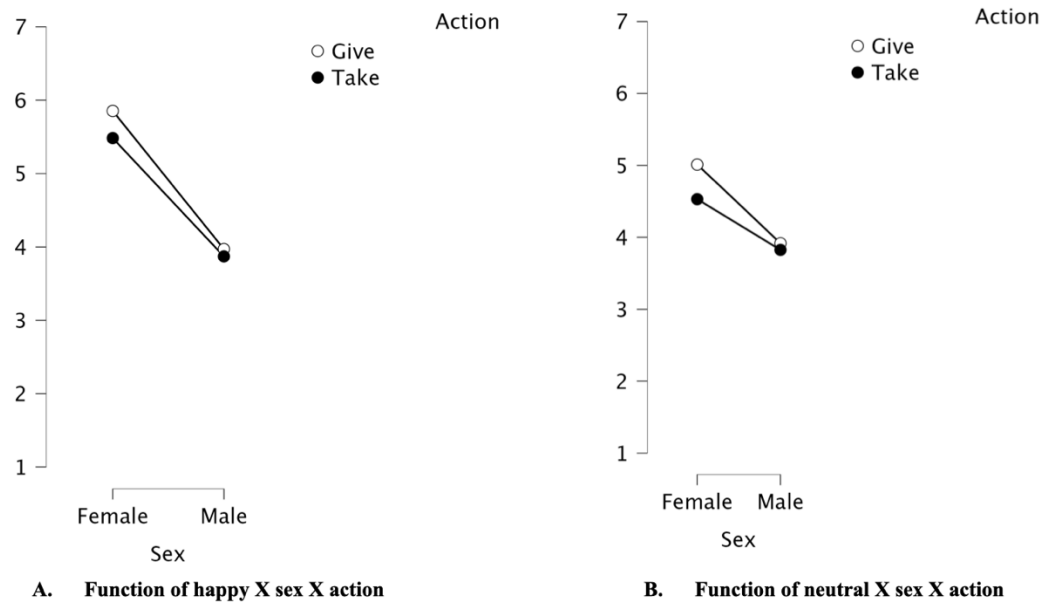


Figure 11. Mean engagement ratings

A significant three-way interaction emerged between Emotion X Action X Object,  $F(3, 87) = 0.15, p \leq 0.001, \eta_p^2 = 0.01$ . To further explore this interaction, Action X Object ANOVAs were conducted separately for each level of Emotion. In the angry condition, take knife was rated significantly higher than give knife,  $t(29) = -4.20, p \leq 0.001$ . In the happy condition, give spoon was rated higher than take spoon,  $t(29) = 6.30, p \leq 0.001$ . For neutral expressions, give spoon was rated higher than take spoon,  $t(29) = 5.28, p \leq 0.001$ . A similar pattern emerged under sad expressions, with give spoon rated higher than take spoon,  $t(29) = 4.73, p \leq 0.001$ . These results indicate that the highest engagement occurred for prosocial actions (give) involving safe objects (spoon), particularly in positive emotional contexts (Figure 12).

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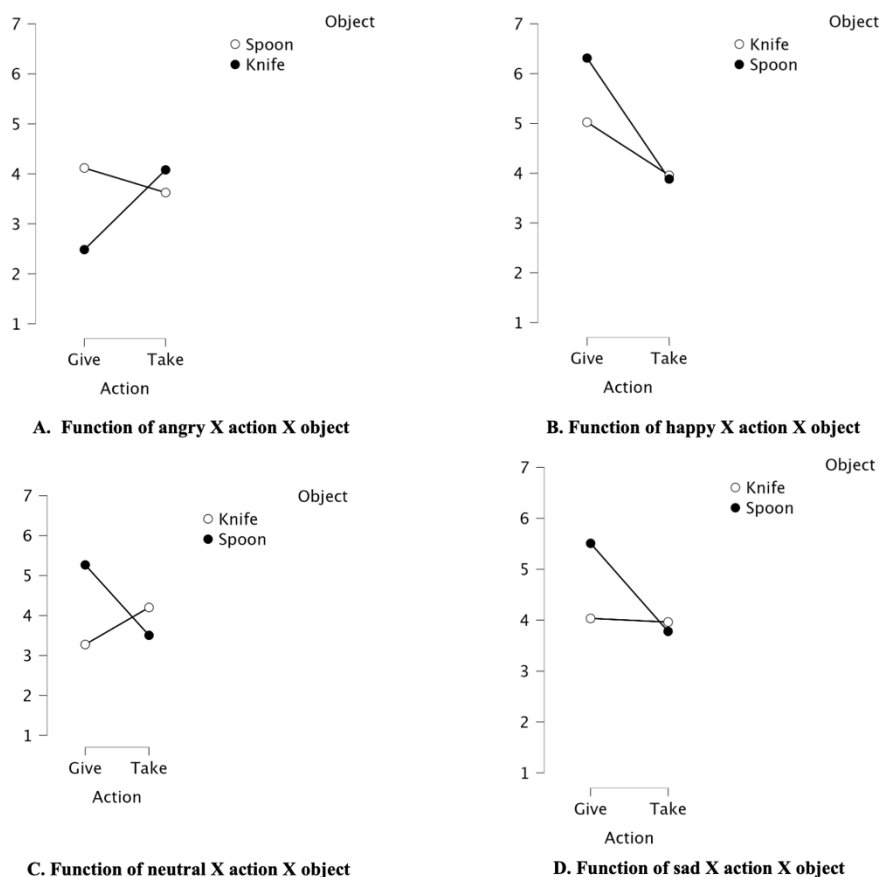


Figure 12. Mean engagement ratings as a function of emotion, action, and object

Finally, a significant three-way interaction was observed for Sex X Race X Action,  $F(3, 87) = 5.08, p = 0.003, \eta_p^2 = 0.15$ . To further examine this effect, separate Sex X Action ANOVAs were conducted within each racial group. For Black faces, the interaction was significant,  $F(1, 29) = 6.45, p = 0.016, \eta_p^2 = 0.18$ . Female-give was rated higher than male-give,  $t(29) = 3.12, p = 0.004$ , and female-take,  $t(29) = 2.85, p = 0.008$ . A similar interaction occurred for Hispanic faces,  $F(1, 29) = 5.89, p = 0.021, \eta_p^2 = 0.17$ . Female-give was again rated higher than male-give,  $t(29) = 2.65, p = 0.013$ , and female-take,  $t(29) = 2.47, p = 0.019$ . No significant interactions were found for White or Asian faces all ( $p \geq 0.29$ ; Figure 13).

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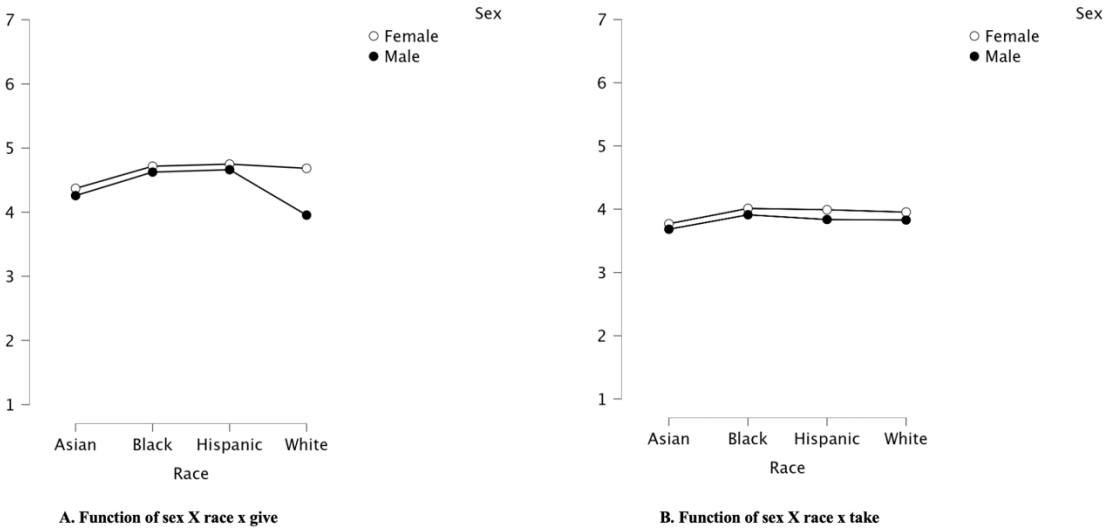


Figure 13. Mean engagement ratings

**Control Tasks**

Four control tasks were conducted to ensure the validity of the study. The first three control tasks were identification tasks to ensure participants could properly identify the shown emotion, sex and race. Analyzing these tasks showed that participants were able to identify emotion correctly ( $M = 90.10\%$ ,  $SD = 0.56$ ), sex ( $M = 98.23\%$ ,  $SD = 0.08$ ), and race ( $M = 92.98\%$ ,  $SD = 0.27$ ) well over the cut-off (70% correct), indicating chance was not involved. Participants had high confidence ratings for emotion ( $M = 6.19$ ,  $SD = 1.07$ ), sex ( $M = 6.68$ ,  $SD = 0.74$ ), and race ( $M = 6.39$ ,  $SD = 0.96$ ), highlighting that not only could they correctly identify these factors but also felt very confident in their ability to do so. Ratings from the Object Classification task were analyzed to determine if the two objects were perceived as distinct in their perceived threat level. The spoon received a mean rating of 1.10 classified as safe, and the knife was 2.63, classified as dangerous. Results demonstrated a high t-value ( $t = 10.25$ ) and extremely low p-value ( $p \leq 0.001$ ), indicating that the difference is not due to random chance. Participants viewed the two objects very differently. Therefore, we can conclude that the knife and spoon are distinct objects.

**Reliability of ESCQ-45**

The ESCQ-45 contains three subscales; however, our study was only interested in the first two subscales. The ability to perceive and understand emotions subscale consisted of 15 items ( $\alpha = 0.59$ ), and the ability to express and label emotions subscale consisted of 14 items ( $\alpha = 0.61$ ). A total score for the 45-item self-report questionnaire resulted in a value of  $\alpha = 0.85$ . These results indicate that the internal reliability of the ESCQ-45 in our sample was attained.

## Discussion

The present study examined how facial expressions of emotion influence an individual's decision to engage in an object handover task. We hypothesized that positive facial expressions, such as happiness, would elicit the highest engagement ratings, while negative expressions, like anger and sadness, would result in the lowest ratings. Neutral expressions were expected to fall between these two extremes. Additionally, we anticipated that variables such as emotion (angry, happy, neutral, and sad), sex (female and male), race (Asian, Black, Hispanic, and White), object (knife, spoon), and action (give, take) would further modulate participants' willingness to engage.

The findings support our hypothesis that facial expressions of emotion influence one's decision to engage in an object handover task. While no previous research has directly examined this specific context, the current results align with broader findings on the role of emotional expressions in social contexts. For example, happy expressions are consistently associated with increased approachability, whereas angry expressions often elicit avoidance (Campellone & Kring, 2013; Marsh et al., 2005). These findings provide evidence that facial expressions function as powerful social signals that shape decision-making to engage in joint action contexts. Happy faces are typically perceived as friendly and inviting, increasing one's willingness to cooperate, whereas angry expressions may signal potential threat or conflict, thereby reducing the likelihood of engagement (Montepare & Dobish, 2003; Tay, 2010; Willis et al., 2011, 2015).

The object involved in the handover influenced participants' decision-making. Specifically, participants were more willing to engage when the object was a spoon rather than a knife. In the present study, results from the Object Classification task revealed that most participants rated the spoon as safe and the knife as dangerous. This supports the idea that object-based threat perception influenced participants' responses in the Engagement task, suggesting that

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the perceived threat level of an object can modulate cooperative decision-making. These findings are consistent with broader literature on emotion and decision-making, which shows that cues signaling potential threat typically elicit avoidance behaviours as a protective response (Campellone & Kring, 2013; Willis et al., 2011).

Interestingly, participants were more willing to take the knife than to give it, whereas the opposite was true for the spoon. This is consistent with prior research on threat sensitivity and object perception. For example, Marsh et al. (2005) found that participants were faster to identify threatening objects when they were held by individuals displaying angry expressions, suggesting that threat-related cues, whether from facial expressions or objects, are quickly detected and influence attention and action tendencies. One possible explanation is that participants were motivated to maintain control over a potentially dangerous object (i.e., the knife) to reduce the perceived threat posed by the other person. In contrast, participants may have felt more at ease giving control of a safe object like a spoon. This interpretation is consistent with research on threat perception and object processing. Bartholow et al. (2005) demonstrated that presence of a weapon can increase aggressive thoughts and defensive behavioural tendencies, suggesting that threatening objects influence how people behave in social contexts. Similarly, Blanchette (2006) found that threatening objects, such as weapons, are more likely to capture attention and be processed faster than neutral items, indicating heightened sensitivity to threat cues in the environment. These findings support the idea that perceived threat associated with certain objects can modulate cooperative decision-making, particularly when safety or control is at stake.

Participants' decisions in the handover task were influenced by the interplay of emotional expressions, the nature of the object, and the action involved. Notably, participants were particularly hesitant to give a knife to someone displaying anger, while they were most willing to

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give a spoon to someone expressing happiness. This pattern demonstrates the importance of integrating multiple social and emotional cues in joint action scenarios. Research indicates that emotional expressions serve as powerful social signals that can modulate cooperative behavior. For instance, emotional expressions have been shown to influence perceptions of trustworthiness and intentions in social contexts, thereby affecting decision-making processes (Tay, 2010). Additionally, the perceived threat associated with certain objects can amplify the impact of negative emotional expressions, leading to increased avoidance behaviors (Bartholow et al., 2005). These findings suggest that the combination of an angry facial expression and a threatening object, like a knife, may heighten perceived risk, resulting in decreased willingness to engage in cooperative tasks. Conversely, positive emotional expressions paired with non-threatening objects may facilitate approach behaviours and cooperative tasks. This highlights the need to consider the combined effects of emotional cues, object characteristics, and action context in understanding sociomotor tasks.

Beyond emotion and object, other factors influenced participants' willingness to engage in the object handover task. Female faces received higher engagement ratings than male faces. This pattern may reflect gender-based stereotypes portraying women as more cooperative and having emotionally expressive traits that are generally associated with warmth and trustworthiness (Hall et al., 2000). Hall et al. found that women are perceived to be more emotionally skilled and nurturing than men, which may enhance their perceived approachability. In contrast, men are often stereotyped as more dominant, assertive, or even aggressive, particularly in emotionally ambiguous or threatening contexts (Tay, 2010). These stereotypes may lead to heightened perceptions of risk or reduced trust in joint actions involving male partners, particularly when a

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threatening object like a knife is involved. As a result, participants may have been less inclined to engage with male actors due to these underlying perceptions.

Racial differences were also observed in engagement ratings. Specifically, participants were less likely to engage with Asian male faces compared to other racial groups, regardless of emotional expression. This may reflect the influence of implicit social biases and culturally embedded stereotypes. Zhang (2010) discussed how Asian Americans, particularly Asian males, are often portrayed as socially awkward, emotionally distant, or lacking agency. All of which are traits that can negatively impact how others perceive their social competence. These perceptions may lead to lower expectations of emotional expressivity or communicative intent, which could explain participants' reduced willingness to engage in a cooperative handover task with Asian faces. Our findings also align with research showing that race and emotion jointly influence social evaluations. For instance, Campbell et al. (2010) demonstrated that identical emotional expressions can be interpreted differently depending on the racial identity of the person displaying them, highlighting the complexity of how multiple social cues shape interpersonal judgments.

### **Limitations**

The limitations of the present study should be acknowledged. First, recruitment took place at a small undergraduate university, which meant we had a modest sample size. This limited the statistical power of our study, that is, the ability to detect true effects. Examples of this are real differences or relationships that exist in the population. When power is low, there's a higher chance of missing real differences or effects (Bhandari, 2021). Since power depends on things like sample size, effect size, and significance level, having more participants would have helped us draw stronger, more reliable conclusions (Bhandari, 2021).

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Additionally, due to the demographic of StFX, participants predominantly identified as white, with only one identifying as West Asian. Racial diversity in participant recruitment is especially important for studies like ours, which examine how people respond to facial expressions during sociomotor tasks. The perception and interpretation of emotional expressions can vary widely across cultures and racial groups, meaning that a demographically uniform sample limits the broader applicability of the findings. For instance, Campbell et al. (2010) emphasized that social judgments, such as approachability, are influenced by in-group biases, where individuals respond more positively to members of their own racial group. This suggests that a more racially diverse sample could have different patterns of engagement, particularly in a task involving expression of facial emotion and working with a partner. Furthermore, the National Institutes of Health (1994) has long stressed the importance of including racially diverse populations in research to ensure findings are representative and relevant across different communities. In the context of joint action tasks, failing to recruit diverse participants may obscure how race and culture influence decisions to engage or cooperate with others. Future research should therefore prioritize recruiting more diverse samples to improve the generalizability and cultural sensitivity of findings in this area.

Lastly, although static images allowed for controlled presentation of facial expressions, they may have constrained the emotional realism of the task. In everyday life, facial expressions are dynamic and occur in motion, often accompanied by other nonverbal cues such as vocal tone or body posture. Relying solely on static imagery may limit the ecological validity of the study, as participants are not exposed to the full range of information typically available in real world encounters. However, a strength of our study is the use of racially diverse facial stimuli from the RADIATE face database, which allowed us to move beyond the widespread reliance on White

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faces in perceptual and social cognition research. This represents a meaningful improvement, as the underrepresentation of racial diversity in facial stimulus sets has been shown to constrain the inclusivity and generalizability of findings in the literature (Cook & Over, 2021). By incorporating diverse facial identities, our study takes an important step toward improving representation and ecological validity in the study of joint action and emotion.

While the study was limited by a modest and demographically narrow sample, the findings still offer relevant scholarly contributions. This research provides new insight into how facial emotions influence decisions to engage in joint action tasks, an area that remains underexplored. Even with a small sample, the observed patterns offer meaningful directions for future research, helping to build a foundation for more comprehensive investigations. As such, our study highlights the value of integrating emotional and contextual cues when examining decision-making in joint action and emphasizes the importance of continuing this work with larger and more diverse samples.

### **Future Considerations**

While the present study provided important insight into how facial expressions of emotion influence engagement in a joint action context, several directions for future research should be considered. First, this study used static images to portray facial expressions. Although participants were able to recognize emotions, static images lack the expressive richness of real-world social interaction. Facial expressions in everyday life are dynamic and unfold over time, often in combination with other cues like vocal tone or posture. Research has shown that dynamic expressions are not only perceived as more natural but also enhance emotional clarity and recognition (van Kleef, 2010). Only incorporating static images may reduce the ecological validity of tasks involving social

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decision-making. Future research should therefore incorporate dynamic emotional stimuli, such as video clips, to better reflect the full range of cues available in natural social contexts.

In addition, studies on joint action have emphasized that effective coordination between individuals depends on the continuous exchange of both motor and emotional signals (Sebanz et al., 2021). When engaging in tasks like object handovers, dynamic expressions may play a key role in signaling cooperation or conflict, helping partners interpret each other's intentions. Incorporating more naturalistic stimuli could improve our understanding of how emotion and context interact to shape engagement in joint action scenarios. These considerations would allow future studies to build on the present findings while offering more nuanced insights into real-world social dynamics.

Second, participants in this study were explicitly told that their partners were cooperative and willing. While this created a consistent and controlled context across all trials, it does not reflect the uncertainty that often exists in real-life social engagement. Introducing variability in perceived partner cooperativeness for example, through ambiguous or clearly uncooperative emotional expressions could help researchers explore how trust and perceived threat affect engagement in joint tasks. Research shows that being in a competitive situation can make people less likely to coordinate with others. For instance, Ruissen and de Bruijn (2016) found that people who played a competitive game before completing a joint task were less likely to coordinate with their partner compared to those who played a cooperative game. This suggests that competition can influence how people behave in joint actions. Including competitive or ambiguous partner behavior in future studies could offer more insight into how trust and cooperation develop in social dynamics. In these less predictable contexts, social cues like facial emotion may carry more

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weight, especially when participants cannot assume the engagement with another person will be positive or safe.

Another important point to consider for future research involves examining how race interacts with emotional expression in shaping engagement decisions. Although our study used racially diverse facial stimuli from the RADIATE face database, the participant sample lacked racial diversity, which limits the conclusions we can draw about how these cues are interpreted across different racial groups. This is especially important given that racial identity and group membership can influence how facial expressions are perceived and responded to in social settings. Cook and Over (2021) criticized the overwhelming focus on White faces in research on first impressions and social dynamics, arguing that this bias restricts both the validity and fairness of findings in the field. They emphasize that a lack of racial diversity in facial stimuli limits our ability to understand social perception in diverse societies. While our use of a more diverse stimulus set helps address this issue, the lack of racial diversity among participants means that we were not able to explore in group versus out group effects. Considering the role of implicit bias and racial stereotypes in shaping social judgments, future studies should prioritize recruiting more diverse participant samples and directly examine how racial identity and emotion jointly influence engagement in joint action tasks. Doing so would help fill a significant gap in the literature and improve the cultural relevance of research concerning sociomotor tasks.

## Conclusions

Emotions shape how we perceive others and guide the social decisions we make in our daily lives. As social beings, we constantly navigate connections that require quick judgments about whether to approach or avoid others. This study examined how facial expressions of emotion influence one's decision to engage in an object handover task. Static facial images were used to isolate and examine the initial decision-making processes involved when engaging with another individual in a cooperative task. The results of the present study demonstrate that facial expressions significantly influence engagement ratings. Happy expressions facilitated a greater willingness to engage, while angry and sad expressions reduced it. Moreover, other contextual factors such as the sex and race of the individual, the action being performed, and the object involved also shaped these decisions. These findings provide insight into how emotional cues conveyed through the face interact with social and situational variables to influence cooperative decision-making.

While prior research has explored how facial emotions impact perceptions of trust and approachability, the current study extends this work by situating emotion within the context of joint action. These findings emphasize the importance of viewing emotion as a dynamic and socially relevant factor in sociomotor tasks. Future research using dynamic facial expressions or real-time cooperative scenarios could build on these results to further explore how emotional information guides our decisions engage with others.

In doing so, this study contributes to the literature on emotion and social decision-making by highlighting the role of facial expressions in modulating engagement during cooperative tasks. It also shows how factors like who your partner is, the type of action, and the object involved can influence people's decisions in these situations. Beyond advancing our understanding of how people relate to one another, these findings may inform the development of emotionally intelligent

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artificial agents in the field of human-robot collaboration (Ahmed et al., 2024). Understanding how humans use facial emotion to guide engagement decisions can support the creation of more intuitive and socially aware technologies.

This work has broader implications for the design of emotionally intelligent systems, particularly in the domain of human-robot collaboration. As robots become more integrated into daily life, it is essential to understand how people interpret emotional cues in collaborative contexts. Our findings may help inform the development of robotic systems that use facial expressions to elicit more natural and cooperative responses from human partners. As Ahmed et al. (2024) note, robots that convey emotion in human like ways are more likely to be trusted and accepted. Integrating findings from studies like this one into robotic design could lead to smoother, more intuitive human-robot collaboration.

In summary, this study lays a strong foundation for understanding how emotion and context work together to influence one's decision to engage in joint action tasks. These insights are not only valuable for research but also have practical applications in technology and other real-world settings.

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**Appendix A – Invitation to Participate**

*Decision-Making in a Shared Task*

**Principal Investigator:**

Dr. Melanie Lam, Associate Professor

Department of Human Kinetics

St. Francis Xavier (StFX) University

Email: mlam@stfx.ca

**Experimenters:**

Sarah Mowat (Undergraduate Honours Student, StFX)

**INVITATION TO PARTICIPATE**

You are invited to participate in this study because you are a healthy adult between 18 and 35 years old and have either normal or corrected-to-normal vision. You also have no known neurological, intellectual, developmental, or physical disabilities that could affect your participation in this study. Additionally, you can access a **PC desktop or laptop** (Mac products are not supported). You also have the option to complete the experiment in the lab at StFX in the Exercise Science Center (PMB Lab, Room 19, 42 West Street).

**BENEFITS**

There are no potential benefits to participating in this study. However, you may gain some insight into the research process, such as learning about formulating research questions, the consent process, research design, and debriefing. Participating in this study will allow us to

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understand better how facial displays influence an individual's decision to engage with another in a shared motor task.

### **RISKS**

The risks involved in participating in this experiment are minimal. The risks are no more significant than those in everyday life. You might experience mental fatigue, as you will be asked to maintain focused attention and concentration throughout the experiment. The experiment will take **less than 30 minutes**; therefore, no breaks will be offered. However, if fatigue becomes too much, you may withdraw from the experiment at any point by pressing the **Control-Alt-Shift** keys on your keyboard and emailing the Experimenter.

You may be a student in a course taught by the Primary Investigator, Dr. Melanie Lam. To ensure no conflict of interest or perceived power relationship is present, a Research Assistant will run your testing session. Participating in this study will not affect grades and treatment in the course, and all statements made will be kept in confidence. Yes, the Primary Investigator will have access to the names of the participants, but only at the end of any given course term. The Honours Student will identify and report all participants by subject number to the Primary Investigator.

### **CONFIDENTIALITY**

Your confidentiality will be respected. Any information resulting from this research study will be kept confidential. All documents and files (e.g., consent forms, data in Excel sheets and statistical programs) will be identified only by a code number and kept in a locked filing cabinet in the Principal Investigator's research office. Any information stored on a computer hard drive will be password protected. Data will not be uploaded to an open-access repository.

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Furthermore, you will not be identified by name in any reports or scientific publications. The data will be used for publication purposes only and retained for a minimum of five years post-publication or until the completion of the study. After that time, raw data, cleaned and summarized data, related files, and other documents (e.g., consent forms) will be destroyed.

## **RIGHTS TO WITHDRAW FROM THE RESEARCH**

Your participation in this study is entirely voluntary. You have the right to withdraw at any time without consequences. You may choose not to answer a question once you begin the study; however, this requires withdrawing participation. If you wish to withdraw from the experiment, please exit the experiment by pressing the **Control-Alt-Shift** keys on your keyboard. Please email the Experimenter to inform them of your decision to withdraw. Data collected up to your withdrawal from the study will be kept for data analysis purposes under strict confidentiality provisions.

## **ACKNOWLEDGEMENT**

Consenting to participation does not waive any rights to legal recourse.

## **COMPENSATION**

You will be entered to win one of three \$25 (CDN) gift certificates from one of the following stores of your choice: Amazon, Apple, Shoppers Drug Mart, Irving, Superstore, or Sobeys.

## **CONTACT INFORMATION**

You understand that if you have any questions or desire further information concerning this study, you should contact Dr. Melanie Lam at [mlam@stfx.ca](mailto:mlam@stfx.ca).

If you have any questions or concerns regarding possible ethical issues, contact the Research Ethics Board Chair, Dr. Christine Lomore, at [clomore@stfx.ca](mailto:clomore@stfx.ca).

**Appendix B – Participant Consent**

You agree to participate in a research project directed by the Principal Investigator. In so doing, you understand fully all the following statements:

You have read and understood the procedures used in this study.

You have been given the opportunity to ask questions regarding the procedures and instructions for this study, which have been answered fully and to your satisfaction.

You understand that the collected data will be used for research publication and kept under strict confidentiality.

You understand the possible benefits of participating in the research study and the potential risks.

You understand that participation in this study is entirely voluntary and that you may refuse to participate or withdraw from the study at any time without any consequences. In the questionnaire portion, you may choose not to answer a question; however, this requires withdrawing participation.

Consenting to participate does not limit your legal rights against the sponsor, investigators, or anyone else.

You understand that you will be entered to win a \$25 (CDN) gift card. The winner will be contacted after the data collection is complete.

**By completing this online research experiment, your consent to participate is implied.**

**Appendix C – Participation Criteria – Self-Report Measures**

*The Influence of Point-Light Displays on Decision-making*

Thank you for your continued interest in participating in our study!

To participate, you must be between 18 and 35 years old. You have no known neurological, intellectual, developmental, or physical disabilities that could affect your participation in this study.

Please answer the following questions:

- Do you have a condition that affects your mood? (e.g., bipolar disorder, depression)
- Do you have a condition that affects your ability to pay attention? (e.g., ADHD, concussion) i.e., Are you able to focus and attend to a task for 15-20 minutes?
- Do you have a condition that impacts your ability to sit comfortably at a computer for 15-20 minutes? (e.g., back pain)

Do you have a condition that negatively impacts your manual (hand/finger) dexterity? (e.g., carpal tunnel)

If you answered ‘**Yes**’ to any of the questions above, you **might not be eligible** to participate to ensure your well-being. Please get in touch with the Experimenter.

If you answered ‘**No**’ to all the questions above and have normal or corrected-to-normal vision, **you are eligible** to participate. Please inform the Experimenter, and they will guide you through the next steps.

Appendix D – Emotional Skills and Competence Questionnaire (ESCQ-45)

<p><b>EMOTIONAL SKILLS &amp; COMPETENCE QUESTIONNAIRE</b></p> <p style="font-size: 2em; color: red;"><b>ESCQ - 45</b></p> <p><small>Author: Vladimir Takšić Ph.D., Assistant Professor, Department of Psychology, Faculty of Philosophy, University of Rijeka, Croatia</small></p>
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This is not a test to examine your knowledge; therefore there is no wrong answer. We are interested in how you usually feel and think. Answer the questions immediately without thinking too much about them. Answer how much the given claims are relevant to you by circling one of the following numbers:

- 1 - Never
- 2 - Seldom
- 3 - Occasionally
- 4 - Usually
- 5 - Always

Claim	Evaluation				
1) I am able to maintain a good mood even if something bad happens.	1	2	3	4	5
2) Putting my feelings and emotions into words comes easily to me.	1	2	3	4	5
3) I can maintain a good mood, even when the people around me are in a bad mood.	1	2	3	4	5
4) Unpleasant experiences teach me how not to act in the future.	1	2	3	4	5
5) When somebody praises me, I work with more enthusiasm.	1	2	3	4	5
6) When something doesn't suit me, I show this immediately.	1	2	3	4	5
7) When I don't like a person, I find ways to let him/her know.	1	2	3	4	5
8) When I am in a good mood, it is difficult to bring my mood down.	1	2	3	4	5
9) When I am in a good mood, every problem seems soluble.	1	2	3	4	5
10) When I am with a person who thinks highly of me, I am careful about how I behave.	1	2	3	4	5
11) I study and learn best, when I am in a good mood and happy.	1	2	3	4	5
12) If I really want to, I will solve a problem that may seem insoluble.	1	2	3	4	5
13) When I meet an acquaintance, I immediately notice his/her mood.	1	2	3	4	5
14) When I see how someone feels, I usually know what has happened to him	1	2	3	4	5
15) I am able to tell the difference if my friend is sad or disappointed.	1	2	3	4	5
16) I can easily think of a way to approach a person I like.	1	2	3	4	5
17) I am capable to list the emotions that I am currently experiencing.	1	2	3	4	5
18) I am able to detect my friend's mood changes.	1	2	3	4	5
19) I can easily think of a way to make my friend happy on his/her birthday.	1	2	3	4	5
20) I do not have difficulty to persuade a friend that there is no reason to worry.	1	2	3	4	5

Please, continue to work on the next page ➡

## FACIAL EXPRESSIONS OF EMOTION AND WILLINGNESS TO ENGAGE

1 - Never      2 – Seldom      3 – Occasionally      4 – Usually      5 - Always

Claim	Evaluation				
21) I am able to express my emotions well.	1	2	3	4	5
22) I can recognize most of my feelings.	1	2	3	4	5
23) I am capable to describe my present emotional state.	1	2	3	4	5
24) I can say that I know a lot about my emotional state.	1	2	3	4	5
25) If I observe a person in the presence of others, I can determine precisely her or his/her emotions.	1	2	3	4	5
26) I do not have difficulty to notice when somebody feels helpless.	1	2	3	4	5
27) My behavior is a reflection of my inner feelings.	1	2	3	4	5
28) People can tell what mood I am in.	1	2	3	4	5
29) I try to control unpleasant emotions, and strengthen positive ones.	1	2	3	4	5
30) There is nothing wrong with how I usually feel.	1	2	3	4	5
31) I do my duties and assignments as soon as possible, rather than think about them	1	2	3	4	5
32) I usually understand why I feel bad.	1	2	3	4	5
33) I try to keep up a good mood.	1	2	3	4	5
34) I am able to tell somebody's feelings by the expression on his/her face.	1	2	3	4	5
35) I can detect my friends' concealed jealousy.	1	2	3	4	5
36) I notice when somebody tries to hide his/her bad mood.	1	2	3	4	5
37) I notice when somebody feels guilty.	1	2	3	4	5
38) I notice when somebody tries to hide his/her real feelings.	1	2	3	4	5
39) I notice when somebody feels down.	1	2	3	4	5
40) As far as I am concerned, it is normal to feel the way I am feeling now.	1	2	3	4	5
41) I have found it easy to display fondness for a person of the opposite sex.	1	2	3	4	5
42) I notice when somebody's behavior varies considerably from his/her mood.	1	2	3	4	5
43) I can easily name most of my feelings.	1	2	3	4	5
44) I am able to express how I feel.	1	2	3	4	5
45) I know how to pleasantly surprise each of my friends.	1	2	3	4	5

Name \_\_\_\_\_

Gender F M

Age \_\_\_\_\_

Education \_\_\_\_\_

Thank you for your cooperation and honesty !