

Responding to Emotions

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Responding to Emotions: Effects of Emotional Tone on Decision-Making

Introduction

A consequence of being human is that, whether conscious or not, emotions are inextricably linked to decision-making. Theoretical and empirical work in decision theory and psychological game theory has explored several channels through which emotions can impact an individual's decision process. This large and growing body of research has focused almost exclusively on the emotions felt by the decision maker. In contrast, we seek to study **how the emotional content of a message received by a decision maker impacts their choices and the degree to which differences can be attributed to emotional contagion.**

Embedding requests with emotional content is common in practice. Charities tend to use collaborative messaging with undertones of sadness and pleading. Politicians often use a mix of collaborative and competitive messaging when campaigning or promoting policies, and incite action by delivering such messages with emotional tones, sometimes chosen strategically.

In 2008, CEO of Maple Leaf Foods Michael McCain issued an apology for health standard failures that lead to listeriosis outbreaks causing 23 deaths and approximately 4,000 illnesses. Despite this failure, customers remained loyal to Maple Leaf Foods, with credit often going to the sincerity of the apology and the personal accountability expressed therein. Would the same message delivered in a neutral or angry tone have had a similar impact?

Novelty and Contribution

While a host of literature exists within the emotional contagion realm, there is a lack of research investigating how specific emotional content of a message effects a decision maker and the degree to which observed differences can be attributed to emotional contagion.

Thus, our motivation with respect to literature is the gap in looking at responding to emotions rather than emotional decision making itself.

To induce emotion, this research will incorporate the expansive power of Veo3’s generative AI software which can produce extremely life like videos of human-like characters. These characters can be coded to express specific emotional profiles. This is extremely beneficial as it allows for enhanced reproducibility across laboratories and allows us to standardize the emotional profiles and content of the messages that the participants receive in the lab.

Further, this research will rely on state of the art facial recognition software which uses advanced neural networks and real time video analysis to characterize and measure unconscious physiological responses to the content of the message itself. This provides more accurate measurements than the traditional method of relying on post-hoc analysis of recorded videos by researchers and their assistants. The latter method can be sub-optimal as many of the subtle cues that are involved in emotional contagion are unconsciously perceived and physiological response cues such as heart rate and blood pressure are again, not necessarily detectable in classical video analysis, even when the researcher has training in this field. In contrast, the facial recognition software we plan to use (Noldus FaceReader) is extensively used in psychological and behavioural science and can detect these subtle and subliminal cues (**!!include FaceReader’s info/ accuracy in an Appendix**).

Experimental Design

Our goal with this experiment is to study how the emotional content of a request affects donations. We design an experiment that separately identifies the effects of the emotional content of the request from the emotions of the decision maker. We do this by eliciting baseline behavior in a neutrally framed donation game and comparing it to emotionally framed donation levels. We control for the decision maker’s emotions using a facial recognition tool (Noldus FaceReader 10) that measures emotional changes between the neutral frame and emotional frames. We quantify emotional contagion as the magnitude change from the neutral frame toward the emotion used in the emotional frame.

Low contagion (small amounts of unconscious emotional change via physiological response) is evidence that the emotional content of the request itself causes changes in behaviour, while high degrees of contagion (large amount of unconscious emotional change via physiological response) are evidence that the emotional tone of the request induces a similar emotion (contagion), thereby driving actions through the decision maker’s own emotions. In other words, our design identifies changes in donation behaviour, separating whether donations increase because of the requester’s emotions (via tone) or the decision maker’s.

By using three types of requests (collaborative, competitive, combative(?) or neutral) and three emotional tones (happy(?), angry, sad, neutral), we are also able to identify whether appeals for donations respond differentially to different emotional tones and under different economic environments. For example, consider the following statements:

(Competitive) Our community has been consistently underfunded, while other regions receive upgrades and expansions. Consider donating to our schools.

(Collaborative) Investing in our community is a shared responsibility and provides the help our students need. Consider donating to our schools.

(Neutral) Our community is requesting funds for projects. Consider donating to our schools. Each of these three statements is to be read by each of the three different emotional tones for a 3×3 design.

1. Emotional Tone in Communication and Decision-Making

Emotional tone – the affective content or sentiment conveyed by language, facial expression, or voice – can significantly shape how recipients make decisions. Unlike a communicator’s internal feelings, emotional tone refers to the outward expression (e.g. angry vs. calm language) that others perceive. Research in behavioural economics and psychology shows that such emotional cues embedded in messages influence trust, generosity, and strategic choices by the recipient.

In Ferracci S., et.al (2021), proposers in an ultimatum game offered more generous splits when facing a *happy* responder and significantly less when facing an *angry* or *disgusted* responder. Similarly, in trust games, **partners with happy facial expressions elicit higher trust (measured as larger investments) than those with angry expressions**, who receive less investment (Zhou, M. et.al, 2023).

In addition, emotional tone in communication also plays a role in financial and policy domains. A recent study of U.S. Federal Reserve press conferences found that Chairman Jerome Powell’s negative emotional tone (as detected in his voice) moved equity markets by a magnitude comparable to a substantive policy change – even when the transcript content remained constant (CITE: REUTERS ARTICLE). This underscores that beyond logical content, the sentiment or tone of a message can independently sway economic decisions. In short, this demonstrates that *how* something is communicated emotionally can shape the recipient’s decisions on giving, trading, or cooperating, independent of *what* is being said ¹.

Psychology studies on persuasion (*NEED CITATION*) mirror these findings: for instance, strong fear-based messages reliably produce greater attitude and behaviour change than neutral ones by heightening perceived risk and urgency (meta-analyses of fear appeals??). Overall, emotional tone serves as a social signal and catalyst in decision-making – whether by evoking empathy, threat, or confidence. Fortunately, economics experiments are increasingly factoring in these emotional dynamics alongside traditional incentives.

2. Emotional Contagion in Economic Decision-Making

Emotional contagion is the phenomenon whereby people “catch” or internalize the emotions of others, often unconsciously, through mechanisms like facial mimicry, vocal tone, body language,

¹We are unlikely to have to convince married couples of this given the timeless adage “It’s not what you said but how you said it”

or shared social context. In decision-making contexts, emotional contagion can occur when the mood of one individual (or a piece of content) influences the emotional state and subsequent choices of another, *distinct* from any direct informational effect of the communication. The **Emotions as Social Information (EASI)** model (Van Kleef, G. A. et al, 2004 **2010??**) formalizes this distinction: an observer may either consciously infer information from another’s emotion (a strategic/cognitive route) or unconsciously mimic and feel that emotion themselves (an affective route)². The latter route is the emotional contagion phenomenon.

Empirical studies have demonstrated emotional contagion in both lab and field settings. In a large-scale Facebook experiment, Kramer et al. (2014) showed that altering the emotional content of users’ news feeds influenced their own posting behaviour. When positive posts were reduced, users’ status updates became more negative, and when negative content was reduced, users produced more positive language. Notably, participants were unaware of the manipulation, so the changes in their behaviour reflect the unconscious *contagion* of mood rather than a conscious response to message framing. The study concluded that “emotions expressed via online social networks influence the moods of others”, providing clear evidence of contagion at scale.

In laboratory games, contagion has also been observed. For instance, in a public goods experiment where groups watched emotional videos inducing fear, disgust, or happiness in one member tended to lower everyone’s subsequent cooperation compared to a neutral condition. A result that displays that it is as if one person’s emotional state “infected” the group’s mood and trust level. Research by Barsade (2002) found that groups with a happy confederate had improved cooperation and less conflict, indicating that one person’s positive emotion can ripple through others to impact collective decisions.

To identify contagion effects apart from direct framing, researchers often use design features like emotion induction that is *incidental* to the decision task or measure participants’ mood changes. For example, one study varied traders’ moods via background music and found mood contagion influenced asset prices even though the music carried no financial information (CITATION NEEDED). Another approach is exploiting natural exogenous mood shocks: economists have linked rainy weather or sports team losses to negative investor sentiment and market moves, attributing this to incidental mood carryover rather than news.

In summary, emotional contagion is a documented mechanism in economic settings: people unwittingly absorb and mirror others’ emotions, which in turn can alter their risk-taking, generosity, or strategic choices. This contagion mechanism is conceptually distinct from emotional framing effects where a message’s tone directly persuades. Instead, contagion operates by changing the recipient’s internal state, which then affects decisions. Modern experiments and data analysis methods (e.g. sentiment analysis, psychophysiology/ neurophysiology) allow researchers to isolate this pathway by controlling for informational content and observing mood-mediated changes in behaviour.

²Indeed there may be neurobiological reasons for this state stemming from “mirror neurons... *EXPAND?*

3. Interactions of Emotional Tone and Message Framing

Some studies have explicitly crossed emotional tone with message framing to examine their interaction. For example, communications can be framed in different ways (gain vs. loss, cooperative vs. competitive) and delivered with different emotional tones (positive, negative, angry, etc.). Health messaging research provides a clear illustration: Gerend and Maner (2011) randomly induced participants to feel fear or anger and then exposed them to either a gain-framed or loss-framed health brochure. They found a significant interaction: fearful participants responded best to loss-framed messages (leading to greater fruit & vegetable intake), whereas angry participants were more persuaded by gain-framed messages. In other words, a mismatched tone/frame (e.g. an angry person hearing a loss frame) was less effective than a matched one. This suggests emotional tone can modulate how framing effects play out, likely because emotions like fear and anger differ in motivation (avoidance vs. approach) and attention, which interact with the message’s focus on costs or benefits.

4. Measuring Emotional Responses in Experiments

Below we list several ways in which we can measure participants’ emotional states experimentally:

1. Self-Report Measures: The simplest and most direct method is asking participants how they feel. Standardized questionnaires like the Positive and Negative Affect Schedule (PANAS) or visual analog scales allow subjects to rate their emotional state (e.g. mood, arousal) after exposure to a stimulus. Self-reports can capture the subjective feeling component of emotion. They are easy to implement (surveys during or after experiments) and can distinguish discrete emotions (asking, for instance, “How angry do you feel?” on a scale). Studies often use self-reports as manipulation checks – e.g. confirming that a scary video indeed raised fear levels. Evidence suggests **contemporaneous self-reports are reasonably valid** if collected immediately. For example, Mauss and Robinson (2009) note that real-time self-reports of current emotion correlate well with physiological and behavioural indicators, whereas retrospective reports are less reliable. Thus, many experiments include immediate emotion surveys. In a public goods game experiment with induced emotions, researchers might ask participants to rate their current stress, happiness, etc., after the stimulus; these self-ratings help link emotional state to subsequent decisions.

2. Facial Expression Analysis: Emotions often manifest in facial expressions, and researchers leverage this through either manual coding or automated facial recognition. A well-known system is the **Facial Action Coding System (FACS)**, which trained coders use to identify muscle movements (Action Units) corresponding to emotions (e.g. AU12 – lip corner raise – for smiling/happiness). In recent years, automated **facial recognition software** (e.g. Noldus FaceReader, Affectiva Affectiva) has enabled real-time emotion detection via webcam. These algorithms analyze facial muscle movements frame-by-frame and classify expressions into basic emotions (happiness, anger, sadness, etc.) with an intensity score (CITATION:

<https://www.frontiersin.org/journals/psychology/articles/10.3389/fpsyg.2020.00329/full>).

For instance, one study used FaceReader to measure participants' reactions to health PSAs: the software output how much "fear" vs "disgust" each viewer's face showed, which predicted message effectiveness. Validation research finds that such software can achieve good accuracy. In one comparison, Affectiva's automated coding correlated highly with facial EMG (electromyography) readings and correctly identified posed happy and angry faces above chance. Automated facial coding has been used in lab experiments to measure subtle emotional responses during ultimatum games or to detect smiling vs. frowning while participants watch negotiation videos. These tools provide continuous, objective data on emotional expression without interrupting the task. However, a point of caution is that these technologies *infer* emotion from expression, which works best for strong, prototypical expressions; some emotions (e.g. moral elevation or subtle anxiety) are harder to capture. Nonetheless, facial analysis is a powerful methodology to observe *in-the-moment* emotional reactions, especially when paired with video stimuli.

Another possible facial reader tech: <https://noldus.com/facereader>

3. Physiological and Neurological Measures: Emotions induce physiological changes. Common measures include skin conductance (sweat gland activity indicating arousal), heart rate or heart rate variability, blood pressure, and pupil dilation. For example, a fearful response to a stimulus often elevates skin conductance and heart rate. These can be recorded with biofeedback devices to quantify emotional arousal. Similarly, facial EMG involves placing electrodes on muscle groups like the corrugator supercilii (brow muscle) and zygomaticus major (cheek muscle) to detect micro-expressions of frowning or smiling. EMG provides a very sensitive measure of valence: greater corrugator activation reliably signals negative affect (frown) while zygomatic activation signals positive affect (smile). For instance, in a bargaining experiment, increased frowning EMG when receiving a low offer **could** indicate emotional irritation, which might predict rejection.

Some experiments also use **hormonal assays** (cortisol for stress, oxytocin for affection) or even **fMRI/EEG** to see neural correlates of emotional processing. While these measures are more intrusive or costly, they offer more objective evidence of an emotional state that complements self-report.

4. Sentiment and Text/Voice Analysis: Use of computational linguistics to gauge emotional tone.

Sentiment analysis involves analyzing text (or transcripts of speech) for emotional content. For example, counting positive vs. negative words, or using machine learning classifiers trained to detect tone (angry, fearful, reassuring, etc.). This approach has been applied to political speeches, social media posts, and news.

An illustrative case is the analysis of Fed chairs' speech transcripts versus vocal tone: content analysis of transcripts can control for the rational information, while voice emotion analysis (using AI to classify audio into emotions like happy, sad, angry) captures the tonal sentiment. In the 2021 Fed study (cited earlier), used ML on audio recordings to assign an emotional score

to each press conference, independent of the words spoken. In other contexts, experiments that allow free-form communication (e.g. chat messages in a multiplayer game) have used sentiment analysis to quantify the emotional tone of messages participants send each other, then linked that to cooperation levels.

Natural language processing (NLP) tools like LIWC (Linguistic Inquiry and Word Count) provide dictionaries of emotion-laden words (e.g. “love”, “terrified”) to quantify how emotional a piece of text is. Similarly, for spoken stimuli, tone of voice features (pitch, volume variation) can be analyzed – high pitch and loudness might indicate excitement or anger. These techniques are especially useful in field studies or online experiments with large text data. For example, one field study of fundraising emails used sentiment analysis to show that expressed positive emotion in the appeal was associated with higher donation rates.

Potentially combining methods for robustness – A lab experiment might use video stimuli and capture facial expressions via webcam, ask participants to self-report feelings after, and possibly record physiological arousal during the video. Convergence of evidence (e.g. a participant’s face shows a frown, high skin conductance, and self-reported anger) gives confidence that the emotional state is real and intense. New technologies (wearables, face/voice APIs, even infrared facial temperature sensing for stress) are expanding the toolkit for emotion measurement.

Keep in mind: ethical and privacy considerations. Participants are usually informed if video or biosignals are recorded, and analyses aggregate data to ensure anonymity of emotional responses.

5. Identification of Causal Effects of Emotional Framing on Economic behaviours

Common identification strategies we might use are outlined below...

1. **Between-Subjects Designs:** Participants are split into groups, each exposed to a different emotional tone or frame. Because of random assignment, personal characteristics balance out across groups. For instance, in a voting experiment, one group sees a political ad delivered in an angry tone, another sees the same ad delivered calmly. Any difference in voting intention between groups can be causally linked to tone. Researchers often confirm that the only systematic difference between conditions is the intended manipulation (through manipulation checks of perceived tone, etc.). By avoiding any overlap in exposure, between-subjects designs also prevent emotional spillovers between conditions.
2. **Within-Subject Controls:** Sometimes researchers use a within-subject design (though less common for emotions due to carryover). For example, each participant might make decisions before and after an emotional stimulus, effectively using each person as their own control. If generosity increases after an empathy-inducing video, one can infer the video caused the change. However, to avoid confounding factors like learning or fatigue, within-subject emotion inductions are used sparingly or counter-balanced in order.

3. **Standardized Emotional Stimuli:** Want to use a set of images or film clips known from prior research to reliably induce a target emotion (fear, disgust, sadness). Use standardized stimuli from databases like the IAPS images or film libraries. The control group might see a neutral video.

Nguyen & Noussair (2022), induced fear, happiness, or disgust in subjects via brief 360 degree videos before a public goods game. The videos were pre-tested to evoke those emotions, and because subjects were randomly assigned to which video they saw, the subsequent differences in contributions could be causally attributed to the induced emotion (fear, happiness, etc. vs. neutral).

4. **Manipulation Checks and Exclusion:** Check that the emotional manipulation takes hold... If a participant in a fear condition doesn't actually report feeling any fear, might want to exclude such cases or analyze separately, as the treatment wasn't received as intended. Causal inference is clearest when participants in the emotion condition indeed felt differently than those in the control.
5. **Isolation of Emotion vs. Information:** vary emotional tone **without changing informational content**. This can be done by creating messages that are identical in facts but differ in tone (using emotionally charged adjectives, imagery, or vocal cues).

The **Powell Fed study** as example: held constant the substantive policy content (by controlling for the text of statements) and isolated the emotional tone in voice. They showed the tone had an effect on markets independent of any new information. In the lab, a charity experiment might use the same script about a cause but record two versions – one read in a trembling, emotional voice and one in a flat, clinical voice – to see how tone alone affects donations. By ensuring participants across conditions receive the same underlying message except for emotional delivery, any outcome differences reflect the causal impact of emotional framing.

More considerations:

Panel data/repeated measures for causality: if the same subject is exposed to different emotional tones over rounds and changes behaviour mainly in emotional rounds, within-subject analysis can pin down the emotional impact while differencing out individual baseline differences.

Causal direction: time the emotional manipulation before the decision. This sequencing (emotion → induction → decision) helps rule out reverse causality (the decision influencing emotion). Some lab studies use physiological measurements in real time to confirm that an emotional spike occurs prior to the decision change. For example, increased heart rate or frowning right after seeing a message, and then an immediate decision shift, suggests the emotion caused the behaviour.

Field Experiments Example: fundraising and political campaigns have embraced A/B testing to causally identify emotional appeal effects. In one field study, DellaVigna et al. (2012)

sent out charitable solicitation letters where some households received a strongly emotional appeal and others a neutral one, or in some cases an option to opt-out to avoid emotional “pressure.” The randomization showed that many people gave mainly due to empathy/guilt from the emotional ask – and some would even pay a small cost to avoid encountering the fundraiser, indicating a causal role of emotional pressure. This kind of evidence, combined with lab replications, solidifies the conclusion that emotional framing has a direct causal impact on economic decisions, not merely correlation.

In summary, peer-reviewed experiments achieve identification through random assignment, careful stimulus design, content controls, and checks on the emotional states induced. The most common and convincing strategy is a randomized experiment varying only emotional tone, thereby attributing differences in giving, voting, or cooperation to that tone with high internal validity. When well-implemented, such designs allow researchers to make strong causal statements – for instance, “Using a sympathetic narrative *causes* higher donations, relative to a factual appeal,” or “An angry tone by a leader *causes* team members to reduce their cooperative effort.” Each study contributes pieces to the puzzle, and collectively they give confidence in the causal linkages between emotional communications and economic behaviour.

6. Key Articles by Category – With Detail

Each of these articles offers insights either into why studying the economic consequences of emotional tone matters/ influences decisions, how to study it in the lab, or what impact it could have in real-world scenarios.

Motivation and Research Gap

1. **Lerner, J. S., Li, Y., Valdesolo, P., & Kassam, K. S. (2015).** *Emotion and Decision Making*. Annual Review of Psychology, 66, 799-823.

Comprehensive review of decades of research integrating emotion into decision-making. Summarizes how emotions (incidental and integral) systematically influence judgments and choices, often in ways classical theories didn’t predict. This article motivates the research by showing that while psychology has documented these effects, economics models are only recently incorporating emotion. It identifies gaps such as the need to study specific emotions (anger, fear, etc.) in social and economic decisions, and calls for more research on interpersonal emotion effects. (Peer-reviewed, high-level synthesis.)

2. **Van Kleef, G. A. (2010).** *The Emerging View of Emotion as Social Information*. Social and Personality Psychology Compass, 4(5), 331-343.

Theoretical piece introducing the Emotions as Social Information (EASI) model. Argues that others' emotional expressions inform observers' decisions by two pathways – inferential (strategic reasoning) and affective (emotional contagion). Highlights a research gap: most decision-making studies focused on a person's own emotions (intrapersonal), whereas the interpersonal power of communicated emotions (emotional tone between people) was under-studied. This paper motivates research into how a sender's emotional tone can strategically shape a receiver's behaviour (important for negotiations, leadership, etc.). It's frequently cited to justify examining emotional tone in interactive economic contexts.

3. **Elster, J. (1998).** *Emotions and Economic Theory*. Journal of Economic Literature, 36(1), 47-74.

Critiques the absence of emotions in economic theory. Articulates the importance of emotions (like anger, empathy, guilt) in real economic behaviour – motivations that standard models often treat as anomalies Elster identifies specific gaps i.e. economic theories of bargaining didn't account for anger leading to costly rejections, and public finance models ignored sympathy driving charity. This piece motivates the integration of emotional factors and essentially sets an agenda that phenomena like emotional tone in communication should be studied to better predict economic outcomes.

4. **Rick, S. & Loewenstein, G. (2008).** *The Role of Emotion in Economic behaviour*. In M. Lewis & J. Haviland-Jones (Eds.), Handbook of Emotions (3rd ed.)

Surveys how immediate emotions impact behaviours like saving, gambling, and bargaining. It emphasizes that emotions are not just noise but can systematically alter time preferences, risk-taking, and social exchange. The authors point out that while psychology had many lab demonstrations, economics at that time had relatively few formal models or experiments capturing these effects. They highlight research gaps such as the need to study emotional carryover (how an emotion from one context affects another decision) and interpersonal emotion (how one person's emotions influence another's choices). This work helps motivate our project by showing that "emotional tone of a request" lies at the intersection of those gaps – it's an emotional carryover transmitted interpersonally.

5. **Hilton, D. (2008).** *Emotional Tone and Argumentation in Risk Communication*. Journal of Judgment and Decision Making, 3(1), 100-110.

Denis Hilton's article discusses how human communication about risks is imbued with emotional undertones that can encourage or discourage actions. It contrasts constative content with performative emotional tone. The paper argues that classical models of rational communication overlook how emotional framing (positive vs. negative tone) can shift the listener's focus and behaviour. It provides mini-reviews of studies where logically identical messages with different emotional wording led to different decisions thus explicitly highlighting the importance of tone. Hilton calls for more research into these pragmatic, emotional aspects of

communication, essentially marking a gap between how people actually decide under risk (influenced by tone) and how models assume they decide (by content only). This serves as a direct intellectual motivation for studying emotional tone effects in economic decision contexts like our project.

Emotional Contagion

1. **Kramer, A. D. I., Guillory, J. E., & Hancock, J. T. (2014).** *Experimental evidence of massive-scale emotional contagion through social networks*. Proceedings of the National Academy of Sciences, 111(24), 8788-8790.

Famous study on Facebook’s news feed experiment. By randomly reducing positive or negative posts seen by ~689,000 users, the authors showed that users’ own posting behaviour became more negative or positive correspondingly. Importantly, this occurred without direct interaction or explicit emotional appeals – evidence of pure contagion. This article is central in proving that emotions can spread in large networks and influence expressed behaviours (like word choice) causally. It also carefully notes that the effect was not due to concurrent changes in content relevance, isolating emotion contagion. This study is a cornerstone for the concept that one person’s emotional tone can infect others’ moods and thereby their decisions, even in an economic context (e.g. consumer sentiment on networks).

2. Barsade, S. G. (2002). *The Ripple Effect: Emotional Contagion and its Influence on Group behaviour*. Administrative Science Quarterly, 47(4), 644-675.

Barsade placed participants in groups to complete a cooperative task (a management simulation) and secretly planted a confederate instructed to display either positive mood (cheerful, energetic) or neutral mood. The study found group emotional contagion: groups with the upbeat confederate caught that mood, which led to improved cooperation, less conflict, and higher perceived task performance. This paper is a classic proof that emotional states pass between people in real-time and significantly change collective outcomes – here, economic-like decisions in a group incentive structure. It helps distinguish contagion from framing because the confederate didn’t overtly persuade or change information, only their emotional demeanor; yet the group’s behaviour changed. Barsade’s work is often cited in both management and behavioural econ literature as evidence that emotional contagion is a real factor in team and market dynamics.

3. **Hatfield, E., Cacioppo, J. T., & Rapson, R. L. (1993).** *Emotional Contagion*. Current Directions in Psychological Science, 2(3), 96-100.

This is a short review piece that introduced the term emotional contagion to a broad scientific audience. It summarizes underlying mechanisms – mimicry, feedback, and synchronization processes by which people tend to automatically align with others’ emotional expressions (e.g. unconsciously mirroring a smile or frown, leading to sharing the emotion). While not specific

to economics, it provides foundational evidence (from experiments and everyday examples) that emotional contagion is a pervasive phenomenon. The authors discuss how contagion can influence group decision-making, noting for instance that in negotiations or businesses, one person’s emotions can set the tone for the whole interaction.

4. **Coviello, L., et al. (2014).** *Detecting Emotional Contagion in Massive Social Networks*. PLoS ONE, 9(3): e90315.

This study complements Kramer et al. by using a natural experiment approach on social network data. The authors took billions of Facebook status updates and used rainfall as an instrumental variable for mood (rainy days tend to induce more negative affect locally). They found that when it rains in one city, not only do that city’s Facebook posts get slightly more negative, but friends *in other cities where it isn’t raining* also post more negative content i.e. possible emotional contagion at a distance. The paper estimates contagion effects size and rules out alternative explanations (friends aren’t just talking about the weather, etc.). This is a valuable real-world evidence that emotional states propagate through social ties and can affect behaviour (posting behaviour here is the outcome, but by extension, purchasing or voting behaviours might also shift with network mood). It solidifies the idea that emotional contagion is measurably present in large economic agents networks and thus relevant for phenomena like market sentiment or political waves.

5. **Dohmen, T., et al. (2006).** *Seemingly Irrelevant Factors in Economic Decision-Making: Evidence from the Weather*. Economic Journal, 119(537), 153-166.

This paper analyzes how transient emotions induced by weather affect economic decisions, illustrating contagion-like mood carryovers. Using bank data and experiments, the authors show that on sunnier days people exhibit more optimism and risk-taking, whereas gloomy weather makes them risk-averse. While not an interpersonal contagion study, it’s key evidence that *incidental mood* (which can spread among people similarly exposed, like within a region) influences decisions such as investors’ willingness to take risks. It supports the broader point that external emotional influences (like environment or others’ mood) can causally impact economic behaviour. By including it, we emphasize how even in the absence of explicit emotional communication, shared mood shifts (a form of collective emotion) change outcomes – bridging to the idea that emotional tone from others can do so as well. This study helps answer how we know it’s emotion causing the change: the authors isolate weather as an exogenous factor, analogous to isolating someone else’s emotional display as an exogenous factor on the recipient.

Experimental Design Precedents

1. **Scharlemann, J. P., Eckel, C. C., Kacelnik, A., & Wilson, R. (2001).** *The Value of a Smile: Game Theory with a Human Face*. Journal of Economic Psychology, 22(5), 617-640.

Players in a one-shot trust game see a photo of their counterpart’s face before deciding how much to trust them. One key finding was that seeing a smiling partner significantly increased the amount sent (trust), whereas seeing a neutral or unsmiling face led to less trust. This is a direct manipulation of the counterpart’s *emotional expression* (tone) affecting an economic decision. The study sets a precedent for our project as it isolates emotional tone (happy facial expression) while keeping the economic structure constant. It shows how to experimentally vary emotional cues (by preparing photos with different expressions) and measure the effect on behaviour. Quantifies how a simple emotional signal can alter outcomes in a game-theoretic context, thereby providing a model for designs where emotional tone is the independent variable.

2. **Sinaceur, M. & Tiedens, L. Z. (2006).** *Get Mad and Get More: The Influence of Expressing Anger on Outcomes in Negotiation.* Journal of Experimental Social Psychology, 42(3), 314-322.

Negotiators expressed either anger or no emotion during deal-making. Expressing anger led to the opponent offering larger concessions and more favourable final agreements to the angry party (provided the anger was viewed as credible and not overly destructive). It’s a clear demonstration that emotional tone can be manipulated (in this case, via scripted verbal expressions of anger) to causally affect economic outcomes in bargaining. As a design precedent, it used trained participants to inject emotion in a controlled way, and measured quantifiable outcomes (concession size). It also explored a boundary condition: if the power dynamic changed or anger was inappropriate, the effect diminished, which informs our project about when emotional tone works. This study is a template for crossing emotional expression with a negotiation context frame; it shows how to instruct participants to display a specific tone and the importance of maintaining realism.

3. **Gerend, M. A. & Maner, J. K. (2011).** *Fear, Anger, Fruits, and Veggies: Interactive Effects of Emotion and Message Framing on Health behaviour.* Health Psychology, 30(4), 420-423.

Participants were induced into an emotional state (fear or anger) and then given either a gain-framed or loss-framed message encouraging fruit and vegetable consumption. The 2x2 design revealed a crossover interaction: fear made the loss-framed message more persuasive, while anger made the gain-frame more persuasive. This study serves as a precedent by showing how to manipulate emotion and message tone, which is analogous to manipulating the emotional tone of a request and the context framing.

Possible procedural inspiration of emotion induction via tasks, then exposure to framed appeal, then measuring behaviour (self-reported diet choices over 2 weeks).

It underscores the need to consider interactions and demonstrates that emotions can moderate framing effects. For our project, it provides evidence on operationalization (simple writing prompts to induce anger vs. fear, standardized pamphlets for framing) and on the importance of matching emotional tone to message type for effectiveness.

4. **Ferracci, S., et al. (2022).** *Shall I Show My Emotions? The Effects of Facial Expressions in the Ultimatum Game.* Brain Sciences, 12(1), 8.

A recent study that directly investigated emotional tone (via facial expressions) in an economic game. In one experiment, participants acted as responders seeing proposers' faces showing happiness, neutrality, anger, or disgust; in another, participants were proposers seeing responders' emotional reactions. The design is a precedent for embedding emotional tone in an economic paradigm.

Results: responders' decisions were mostly driven by offer fairness (only a small effect of proposer emotion), but **proposers offered significantly more when facing a happy-looking responder and the least for an angry/disgusted responder**. This indicates proposers anticipated rejection from negative-emotion responders and adjusted accordingly.

Ferracci et al. exemplify how to operationalize emotional tone with visual stimuli (they used validated facial expression photos) and measure both first- and second-mover behaviour changes. For our project, it's a valuable template on incorporating emotional expressions into a controlled economic game and it highlights asymmetric effects (tone may matter more for one side's decision). Being peer-reviewed and neuroscientifically oriented, it also suggests measuring neural/physiological responses, though the key takeaway for design is the use of images to convey tone.

5. **Zhou, M., Hu, Y., & Wang, D. (2023).** *Trust or Distrust: The Effect of Facial Emotion and Trustworthy behaviour on Trust Decision-Making.* Psychologica Belgica, 63(1), 105-119.

Repeated trust game: participants interacted with multiple counterpart players that differed in both past behaviour (trustworthy vs. untrustworthy returns) and facial emotional expressions (happy vs. angry, and varying arousal levels).

Precedent: it crosses an emotional cue with a framing/context cue (the partner's reputation). Key findings: investors sent more money to partners who not only had proven trustworthy but also displayed happy facial expressions, and they sent significantly less to partners showing angry expressions even if those partners had a good track record. It also noted that when behaviour and facial emotion were inconsistent, participants relied more on behaviour than on facial tone.

Zhou et al. give a design where emotional tone is operationalized via photos and varied within a subject across rounds. This allowed them to see how quickly participants update trust based on emotional signals. Precedent: combining emotional tone with another important factor (collaborative vs. competitive behaviour framing). It informs our design to consider dynamic settings and that emotional tone effects might diminish when objective behaviour feedback is available. The paper provides methodological insight on using multiple stimulus persons and ensuring expressions are standardized. It's also peer-reviewed, reinforcing the result that emotional tone (a simple smile or frown) can significantly sway economic decisions like trust, which is central to our project's thesis.

Methods for Emotion Measurement

References on tools/methods to measure emotions in experiments, ensuring we can quantify participants' emotional responses to treatments:

1. **Mauss, I. B. & Robinson, M. D. (2009).** *Measures of Emotion: A Review*. *Cognition and Emotion*, 23(2), 209-237.

A highly cited review article that evaluates different methods of measuring emotion (self-report, physiological indicators, facial behaviour, etc.). It provides guidance on reliability, validity, and convergence of measures. For example, it notes that real-time self-reports of emotion tend to correlate well with facial and autonomic responses, supporting their use. It also discusses pitfalls (e.g. self-report bias, the need for immediate measurement before emotions dissipate).

This is a key reference for justifying our measurement approach: if we use self-reported mood or discrete emotions post-stimulus, Mauss & Robinson reassure that's a valid approach. Likewise, if we include psychophysiology or coding of facial expressions, this review covers best practices and typical effect sizes. Overall, it ensures our methodology section stands on solid evidence about how to capture emotions in the lab.

2. **Kulke, L., Feyerabend, D., & Schacht, A. (2020).** *A Comparison of the Affective iMotions Facial Expression Analysis Software with EMG for Identifying Facial Expressions of Emotion*. *Frontiers in Psychology*, 11, 329.

This is a methodological study comparing an automated facial coding software (Affdex by Affectiva) against the gold-standard of facial EMG readings. They had participants make happy and angry facial expressions and measured both methods' outputs. The results showed high correlation between software estimates and EMG, and both could correctly distinguish happy vs. angry expressions beyond chance. The software slightly outperformed EMG in not misclassifying neutral as negative as often.

This paper is important for our project if we plan to use automated facial emotion tracking. It indicates that such tools are sufficiently accurate to trust in an experiment (with the benefit of being less invasive than attaching electrodes). We can cite this to justify using a webcam-based facial analysis (or some other tech...) to measure participants' reactions, or to validate our emotional tone manipulations (e.g. confirming participants actually frowned more in the anger condition). It's peer-reviewed and provides specifics on calibration and which emotion metrics are reliable, guiding our implementation.

3. **Tausczik, Y. R. & Pennebaker, J. W. (2010).** *The Psychological Meaning of Words: LIWC and Computerized Text Analysis Methods*. *Journal of Language and Social Psychology*, 29(1), 24-54.

This article introduces and validates the **LIWC (Linguistic Inquiry and Word Count)** tool, one of the most widely used sentiment analysis dictionaries for text. It explains how word categories (positive emotion words, negative emotion words, anger words, etc.) are defined and how their frequencies in a text can serve as proxies for emotional tone. It also reviews studies that used LIWC to successfully predict outcomes (e.g. depressive symptom levels from diary entries, persuasiveness of speeches from emotional word use). For our project, if we intend to analyze the emotional tone of written or spoken content (like transcripts of requests or participants' written responses), this is a key reference supporting the method. It assures that counting emotion-laden words is a validated measure of sentiment and can be done reliably with software. Also, if we plan to ensure our stimulus messages differ in emotional tone, LIWC can quantify that difference (e.g. the emotional version has, say, 5% of words in the sadness category vs. 0% in the neutral version). Thus, Tausczik & Pennebaker (2010) underpins any text-based sentiment analysis in our methodology, ensuring we have a scientific basis for claims about emotional tone in language.

4. **Gorodnichenko, Y., Pham, T., & Talavera, O. (2021).** *Social Media, Sentiment and Public Opinions: Evidence from #Brexit and #USElection*. (Published as NBER Working Paper No. 24631; later in *European Economic Review*, 136).

(If focusing specifically on the Fed Chair tone study: Gorodnichenko, Pham, & Talavera (2021) *Media Sentiment and Central Bank Communication*. NBER WP and *Journal of Monetary Economics*, forthcoming.)

This entry represents **voice and sentiment analysis in an economic context**. The researchers used machine learning to analyze central bank speakers' vocal tone for emotional cues and separated that from textual content. They found emotional cues in voice predicted market movements. We include this as a methodological reference showing how to quantify vocal emotional tone. It describes extracting acoustic features and using an algorithm to classify emotions (happy, sad, neutral, etc.), which is exactly the kind of method we might use if our experiment involves audio/video of requests. Moreover, it validates that such classified emotions correlate with meaningful outcomes (market index changes), supporting the sensitivity of the method. While this study is an application, from a methods standpoint it demonstrates state-of-the-art sentiment analysis beyond text – something we can leverage. It assures that capturing tone via technology (AI analysis of voice) is feasible and informative in economic research.

5. **Cowen, A. S. & Keltner, D. (2017).** *Self-report Captures 27 Distinct Categories of Emotion Bridged by Continuous Gradients*. *Proceedings of the National Academy of Sciences*, 114(38), E7900-E7909.

Uses a large sample to map out a rich emotional space based on self-report responses to video stimuli. Participants watched short emotionally evocative video clips and reported their feelings; analyses revealed 27 emotion categories (e.g. awe, empathy, nostalgia) rather than just the basic six, with smooth gradients between them. We cite this as a cutting-edge approach to

measuring nuanced emotional responses. It shows that self-report, when done with fine granularity and sophisticated analysis, can differentiate subtle tones (which might be useful if our experiment expects complex emotions from participants, not just positive/negative). The study also produced an interactive map of emotion semantics.

Cowen & Keltner might justify using more granular emotion scales or multiple adjectives to capture the richness of participants' reactions to our stimuli. It also reminds us that emotional tone isn't binary – there are multiple distinct emotions that could be relevant (e.g. anger vs. disgust both negative but with different effects). Methodologically, it encourages moving beyond a single valence measure to a profile of emotional response, if needed. This is useful if our design might induce, say, both anger and sadness and we want to tell them apart via measurement.

Real-World Applications

1. **Small, D. A., Loewenstein, G., & Slovic, P. (2007).** *Sympathy and Callousness: The Impact of Deliberative Thought on Donations to Identifiable and Statistical Victims.* *Organizational behaviour and Human Decision Processes*, 102(2), 143-153.

Demonstrates the *identifiable victim effect* in charitable giving. In experiments and surveys, people gave significantly more to a single named suffering individual (with an emotionally compelling story) than to a statistical group of victims, even when logically the group donation would help more people. Furthermore, when participants were made to think analytically (deliberative thought), their donations to the identifiable victim dropped, suggesting that emotional gut reactions drive generosity, and too much thinking dampens it. This real-world implication is huge for fundraising campaigns: the emotional tone and personal appeal of a request can outweigh factual appeals. We include this as it directly shows how **emotional tone of a request (heartfelt narrative) causally increases giving in practice**, and quantifies the effect. It's a peer-reviewed field/lab study spanning psychology and economics, providing external validity to our experimental focus. It underscores the importance of not just demonstrating effects in lab tasks but also understanding them in contexts like charity campaigns where policy and marketing strategies are developed.

2. **Brader, T. (2005).** *Striking a Responsive Chord: How Political Ads Motivate and Persuade Voters through Emotional Appeals.* *American Journal of Political Science*, 49(2), 388-405.

A widely cited study in political science analyzing campaign advertisements. Brader conducted experiments exposing participants to political ads that varied only in emotional content (music and imagery designed to evoke either enthusiasm or fear), while keeping the candidate's message identical. He found that enthusiasm appeals (uplifting music, positive imagery) mobilized committed supporters – increasing their intention to vote, whereas fear appeals (ominous

music, threat imagery) persuaded undecided voters by increasing information seeking and reducing reliance on party cues.

This research provides real-world parallel to our interest: it shows emotional tone can be a strategic tool in influencing voter turnout and choices. The fact that enthusiastic vs. scary tone had different effects also informs our understanding of *which* emotion to use for what goal. As a peer-reviewed field experiment embedded in real campaign materials, it validates that the lab findings on emotional framing scale to large-scale behaviours like voting. Further, Brader (2005) highlights the applicability of our research where emotional tone isn't just an academic curiosity; it can swing elections (e.g. through turnout). It also gives us a concrete example of emotional framing in mass communication, relevant for policy messaging or public appeals.

3. **Gorodnichenko, Y., Pham, T., & Talavera, O. (2021).** *The Voice of Monetary Policy: Emotional Tone and Market Reactions*. NBER Working Paper No. 29597 (published in 2022).

This study analyzed Federal Reserve press conferences by applying voice emotion recognition to the Fed Chair's spoken words. The authors found that when the Chair's tone sounded more negative or worried (even if the policy content was unchanged), the stock market reacted with significant declines, and vice versa for a positive/upbeat tone. In fact, a shift from a positive to negative tone could move the S&P 500 by as much as 200 basis points.

Crucially, they controlled for the textual content of the statements, isolating tone as the driver. This is a compelling real-world example showing emotional tone can have concrete economic consequences: trillions in market value can hinge on the perceived sentiment of a central banker's voice. We include it to emphasize the stakes of our research – understanding emotional tone can impact financial markets, investment decisions, and perhaps broader economic expectations. It demonstrates that even highly sophisticated actors (investors) are influenced by emotional cues.

For our project, it provides external validation. It's also a case where improving policy communication might require managing emotional tone, which is an angle we can mention as an implication.

4. **DellaVigna, S., List, J. A., & Malmendier, U. (2012).** *Testing for Altruism and Social Pressure in Charitable Giving*. Quarterly Journal of Economics, 127(1), 1-56.

A field experiment sending fundraisers door-to-door to solicit donations, with some households randomly assigned to receive a flyer allowing them to opt out ("Do Not Disturb" to avoid the ask). The study found many people took the opt-out to avoid facing the solicitor, and overall giving dropped when opt-out was easy. The interpretation is that a significant portion of giving was driven by **social pressure and empathy guilt** – emotional discomfort of saying no face-to-face.

Shows the power of in-person emotional appeals (and the aversion they can cause). This research helps to quantify emotional factors in a market for charity: some people donate not because of pure altruism or information, but because the *emotional tone of a personal ask (the guilt/pity invoked)* compels them, and if given an escape, they avoid the emotional encounter to not feel bad. This informs our research on responding to emotions by illustrating that emotional tone has a *cost* or *benefit* that people anticipate. Also underscores that emotional tone can have welfare implications (people might prefer to avoid it).

5. **Fowler, J. H. & Christakis, N. A. (2008).** *Dynamic Spread of Happiness in a Large Social Network*. BMJ (British Medical Journal), 337, a2338.

A longitudinal analysis of 20 years of data from the Framingham Heart Study network, examining how happiness (measured by repeated surveys) spreads through social ties. They found that if someone becomes happier, their friend living nearby is 15% more likely to become happier, and the effect extends to friends of friends (up to three degrees, although it is diminishing). Notably, happiness spread *more through face-to-face contacts* than distant ones, suggesting the role of emotional communication in person.

We include this as a real-world epidemiological study of emotional contagion with clear economic implications (happiness is linked to productivity, health behaviours, etc.). It provides evidence that positive emotional states can cascade in communities, which might translate to economic outcomes like consumption patterns or voting turnout (happy people might be more civic-minded, for instance).

The BMJ study supports the idea that *emotional climates* can emerge, which our project on emotional tone of requests can tap into: a leader's or marketer's emotional tone could trigger broader shifts in group mood and subsequent behaviours. It's a rigorous, peer-reviewed study using statistical network analysis, adding depth to our application examples – showing that beyond single interactions, *collective emotional dynamics* are at play in the real world.

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