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Research Project: Draft Prerequisite Assignment

You're ready to plan a draft when you know the following:

1. **You know who your readers are, what they know, and why they should care about your problem:**
   My readers will be undergraduate cognitive science students across the country that are interested in Music Embodied Cognition, that have at least *some* knowledge on embodied/distributed cognition and are interested in learning about both *how* music induces emotional states over time, and how researchers have recorded these changes from an embodied cognition perspective. They should care about this because (1) measuring the persistence of emotional states when exposed to music is *mostly* unexplored, and (2) they can learn more about how traits within music influence emotional states.

2. **You know the kind of ethos or character you want to project.**
   I want to project a character that is passionate about music, that is aware of differing theories of the mind within cognitive science, presents a sense of skepticism while representing information, but also wants to portray boldness/conviction towards the embodied perspective.

3. **You can sketch your question and its answer in two or three sentences.**
   How does music influence the induction of emotional states over time?
   Many emotional states have been recorded within various studies; however, compared to other states, *happy* and *sad* states have been recorded/studied over time the *most*. By carefully selecting certain musical excerpts, and by accounting for both the intrinsic and extrinsic properties of music within a study, it is possible to induce *happy* and *sad* emotional states and record their fluctuations over time through self-report methods, skin conductance levels, and heartrate levels.

4. **You can sketch the reasons and evidence supporting your claim.**
   Claim: Carefully selected positive and negative excerpts can be effective in inducing *happy* and *sad* states. Musical excerpts that induce these states are heavily dependent on the Eight Avenues of Musical Affect: *Mimetic Participation, Anticipation, Expression, Acoustic Impact, Implicit and Explicit Analysis, Cultural/Personal Associations, Exploring Taboos*, and the *Intangibility of Musical Sounds*.
   - **Reason:** By using valence-arousal self-report, recording skin conductance levels, and through measuring heartrate, *happy* and *sad* emotional states can and have been measured over time.

     1. "According to our valence–arousal self-report, the valenced adjectives changed quickly to neutral ones after the second minute of the recovery phase, which is congruent with Gomez et al. (2009) and Kuijsters et al. (2016), both using videos. However, over time, SCL remained increased at least 4 min more for positive and negative EIM." **(Ribeiro et al., 2019).**

     2. Based on subjects' reports, the musical mood induction used in this experiment was successful. The subjects reported experiencing moods while listening to the music; in many cases strong emotions. The subjects' median emotional intensity ratings indicate distinct emotional experiences: the median rating was 6 for the fear and happiness inductions and 4 for the sadness induction on a scale of 0 (''none'') to 9 (''very much''). No differences were found on any of the traditional cardiovascular

measures examined, but evidence was found that the heart rate decelerated during the sadness induction and accelerated during the fear inductions. Differences in total breath length and total expiration length were found in the expected direction (slower respiration during the sadness than the fear or happiness inductions) on the time-domain measures but not when changes during the clips were examined. **(Etzel et al., 2006).**

3. Concerning the electrodermal measures, the finding of higher number of SCRs to happy than to sad music also parallels our previous observation of greater SCRs to happy than sad short musical excerpts (Khalfa et al., 2002). However, contrary to some previous experiments (Bartlett, 1999; Krumhansl, 1997; Nyclicek et al., 1997) using longer and musically more complex stimuli, we did not confirm any differences in respiration and heart rates between sad and happy music. These discrepancies may thus be explained by the characteristics of the excerpts. Our results have shown that the musical emotions were more differentiated after 30 s. Longer and more emotional (musically more complex) excerpts are then more likely able to induce different respiration and heart rates in response to happy and sad music. **(Khalfa et al., 2008).**

- **Reason:** A person's emotional state induced by musical stimuli is a result of both the intrinsic and extrinsic properties of music (musical structure vs the association of the music with previous experiences).

1. Our aim was to verify with the tempo and rhythm conditions that the happy/sad distinction would rely upon the melodic content rather than solely upon entrainment to tempo and/or rhythm. We verified our hypothesis since the happy/sad music distinction by SCRs, EMGz, and DBP was not found for the happy R/sad R (rhythm preserved), and happy T/sad T (beat-alone) conditions. This happy/sad distinction mainly relies upon the strong physiological reactions to happy pleasant excerpts that were clearly different from the happy R and happy T stimuli. The physiological effects of happy melodies can not be explained only be their stimulating properties since comparable levels of arousal were reported for the happy, happy R and happy T conditions. Pitch variations thus appear to be necessary for the psychophysiological happy/sad distinction. **(Khalfa et al., 2008).**

2. Another aspect to be taken into account is the multifaceted emotional experience, which underlies sad music since it is often described by participants as melancholic yet pleasant, and often as unpleasant. In the case of our sample, they felt the negative EIM as sad and unpleasant in congruence with previous studies (Baumgartner et al., 2006; Nater et al., 2006). Otherwise, it would be perceived as calmer and decreases SCL (Mori and Iwanaga, 2017). Future studies should include an investigation regarding pleasantness and chills of sad excerpts to have a broad view of the musical evoked emotions. **(Ribeiro et al., 2019).**

3. However, our results contrast with Krumhansl (1997) which also used the Adagio in G minor from Albinoni composer excerpt with a duration of 3 min. Then, after having cautiously observed the performed induction, we noticed that the author included another sad excerpt from Samuel Barber, the Adagio for Strings, Op. 11, which has a different minor tone, which, compared to Adagio in G minor, is much slower. We can suggest firstly that divergence in the characteristics of the excerpts might be crucial for HR results since musical features interplay in modulating emotions (Peretz et al., 1998; Sloboda and Juslin, 2001; van der Zwaag et al., 2011). Secondly, cross-cultural comparisons in the literature suggest that emotional responses can be quite differently felt by dissimilar musical cultures (Walker, 1996; Balkwill and Thompson, 1999). Finally, the participants in Krumhansl's study had formal musical training, which can alter the perception of the musical stimuli, consequently the emotions induced (Kawakami et al., 2013). **(Ribeiro et al., 2019).**

5. **You know the questions, alternatives, and objections that your readers are likely to raise, and you can respond to them.**

   Issue: Is using self-report methods counterintuitive when testing music on emotional states? In other words, will someone self-reporting possibly cause errors?

   Response - Of course it is possible for self-reports to have errors, as humans misreport things all the time. However, when combined with other forms of recording data like Skin Conductance, Heart Rate, etc., it still makes them useful. From an embodied cognition perspective, an exhaustive list of the agent's resources is needed in order to successfully conduct a study.

   Issue: "Sadness" or "Negative musical excerpts" seem to induce more than just negative emotions. Does this invalidate your claim?

   Response: While it is true that there is a vast complexity to "sad" music and how it affects an individual's emotions, it does not invalidate the claim that negative excerpts will induce "sad" emotional states a majority of the time within research. I do however think it would be foolish to ignore the issue brought up here, as do other scientists, which is why the study of arousal vs valence is so prevalent within this area of research.