MODIFYING PRESENTATION LEVEL DOESN'T AFFECT LISTENERS' EMOTIONAL RESPONSES TO SOUNDS

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Introduction

Acoustic stimuli can be used to assess listeners' emotional reactions to sounds. For example, the International Affective Digitized Sounds (IADS-2)[1] is a list of naturally occurring non-speech sounds that vary along the dimensions of valence (pleasant - unpleasant) and arousal (calm - excited). Researchers typically present subsets of the IADS-2 corpus that have been modified so that they are at set levels regardless of the original levels or the loudness that you might expect to experience the sounds in daily listening. There is some evidence that loudness has a significant impact on emotional reactions to sounds. The current study aimed to establish whether presenting IADS-2 stimuli at set levels that reflect expected loudnesses would change listeners' emotional reactions compared to presenting the sounds at their originally recorded loudnesses.

Research Questions:

1. Do descriptions of naturally-occurring non-speech sounds elicit consistent expectations about loudness in daily listening?
2. Can a list of sounds be identified that represents each of 5 pleasantness/arousal categories at each of 3 loudness levels?
3. Does sound loudness category impact ratings of emotional reactivity?
4. Do perceived valence (pleasantness) & arousal ratings vary when sounds are presented at their original loudness versus modified loudness levels?
5. Are reported pleasantness/arousal reactions consistent across participant groups?

Method

Design: A descriptive two-phase study

Participants: Young typical hearing adults (Phase 1, N=25; Phase 2, N=12)

Measures

- **The International Affective Digitized Sounds (IADS-2)[1]:** A corpus of naturally occurring emotionally evocative non-speech sounds.
- **Expected Sound Loudness Survey:** An online survey with descriptors of 155 IADS-2 sounds. Participants indicated expected loudness categories (soft, average, & loud) for each sound.
- **Self-Assessment manikin (SAM)[2]:** A self-report affective rating system with a graphical representation of valence (pleasantness) & arousal.

Procedure

Phase 1

Participants indicated the expected loudness for 155 IADS-2 sounds

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75 sounds were selected (IADS-75) to represent 5 pleasantness/arousal categories at 3 loudness levels

Phase 2

The IADS-75 list was presented in two conditions with presentation levels centered around 65 dB SPL. Participants completed the SAM in response to each sound.
Condition 1 (Modified-Loudness): The loudness levels for expectedly soft and loud sounds were modified to be -10 & +10 dB, respectively, relative to the average sounds.
Condition 2 (Original-Loudness): Sounds were presented in their original format[1].

↓

Repeated measures and paired comparisons of emotion ratings were performed across conditions

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Results and Discussion

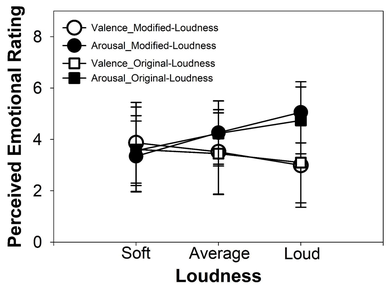
Q.1. Did descriptions of naturally-occurring non-speech sounds elicit consistent expectations about loudness in daily listening? Somewhat. There was considerable variability in participants' ratings of the expected loudness of most described sounds. For example, the descriptor for the "harp" sound received 16 votes for soft and 10 votes for average. For the purpose of this study, the loudness category that received the majority vote was assigned to each sound. Of the 155 descriptors, 30 were assigned to soft, 59 to average, and 66 to loud categories.

Q.2. Can a list of sounds be identified that represents each of 5 pleasantness/arousal categories at soft, average, and loud levels? Yes.

- Pleasantness/arousal categories were assigned to the sounds in each loudness category per the following protocol[3].
  - ✓ Pleasantness/arousal norm values[1] were ranked for each sound.
  - ✓ Sounds were chosen so that ratings for stimuli in the two high-arousal categories would be matched, stimuli in the two low-arousal categories would be matched, and so on.
  - ✓ Examples of sounds in each category are at right.

	High Pleasant High Arousal	High Pleasant Low Arousal	Neutral	Low Pleasant High Arousal	Low Pleasant Low Arousal
Soft Sounds					
Average Sounds					
Loud Sounds					

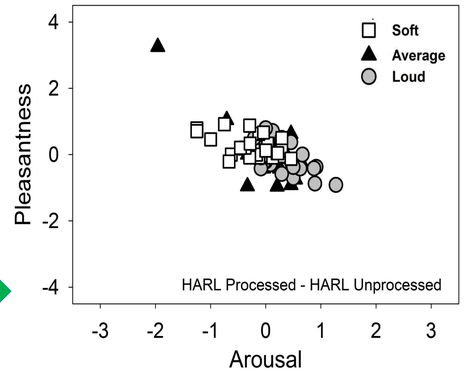
Q.3 Did sound loudness category impact ratings of emotional reactivity? Yes.

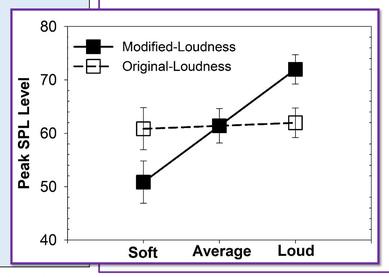


- Overall, there was a significant main effect of loudness category for both pleasantness (F=30.515, $p < .001$) and arousal (F=114.14, $p < .001$). Soft sounds were significantly more pleasant than loud sounds ($p < .001$). For arousal, as loudness increased, sounds were significantly more arousing ($p < .001$).
- The figure at left demonstrates these differences.

Q.4. Did perceived valence (pleasantness) & arousal ratings vary when sounds were presented at their original loudness versus modified loudness levels? No.

- Although expected loudness categories had an impact on perceived emotional reaction to sounds, presenting the sounds at original or modified loudness levels did not significantly change our participants' ratings of pleasantness or arousal.
- The figure at right shows the subtle changes between the two processing conditions.

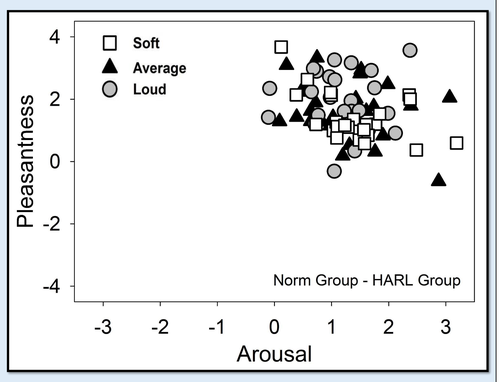




- As shown, there is a small trend where soft sounds were rated more pleasant & less arousing in the modified-loudness condition and loud sounds had the opposite trend.
- However, interactions of loudness and processing conditions were not significant. Pleasantness - F=1.930, $p = .19$, Arousal - F=.170, $p = .69$.
- This suggests that attributes such as auditory memory might be more important than sound intensity when participants rate their emotional reactions to sounds.

Q.5. Were reported pleasantness/arousal reactions consistent across participant groups? No.

This figure shows differences in the pleasantness & arousal ratings reported by participants in the normative study by Bradley and Lang[1] compared to our participants.



- On average, Bradley and Lang's participants reported more pleasantness (F=229.759, $p < .001$) and arousal (F=187.692, $p < .001$), and had greater variability in their responses.
- It is possible that these findings are the result of group-wise differences in attributes such as cognition[3] or emotional intelligence[4] which have been shown to impact emotion perception, or differences in response judgements resulting from different cognitive processes or contexts. As a result, these findings should be interpreted with caution until data are explored for a larger representative sample of participants.

Conclusion

- These data support previous research demonstrating that loudness impacts individuals' judgements about their emotional reactions to naturally-occurring non-speech sound recordings. However, our findings suggest that this impact is primarily due to recollection of prior judgements about these sounds when experienced at different loudnesses in daily listening, and that the impact of the actual intensity of the sound experienced in the moment is much more subtle.
- This suggests that lack of congruity between stimulus presentation level in the lab and expected loudness of sounds that naturally occur in daily listening might obscure differences in emotional ratings across presentation levels.
- The list of 75 IADS sounds selected for this study can be used to reflect each of 5 pleasantness/arousal categories at soft, average, and loud levels for researchers hoping to present IADS stimuli at naturalistic levels.

References

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