Exploring the boundaries of variability of Sonic DNA® and sonic logos.

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Background

- A sonic logo is a short, audible phrase that can act as a mnemonic aid to retrieve verbal information about a brand (Yalch, 1991).
- It must be recognisable and meet the unique characteristics of the brand (North et al., 2016).
- Sonic logos frequently vary over time and for branding campaigns (Graakjær, 2019).
- Varying timbre and tempo in short melodies impairs explicit melodic memory (Halpern & Müllensiefen, 2008) and perceived similarity of melodies decreases with increasing pitch-distance in transposition (van Egmond & Povel, 1996).
- Melodic contour of melodies up to 11-notes can be retained with transposition (Edworthy, 1985).

Research questions

- Can we quantify the boundaries of variability of Sonic DNA®?
- To what extent of severity can a sonic logo be varied where it remains recognisable to the listener?
- Are there differences in the extent to which musical parameters can be varied where the sonic logo remains recognisable?

Hypotheses

- Recognition of sonic logos would decrease with increased levels of manipulation (mild, medium and severe).
- Sonic logos would remain recognisable with mild manipulations, demonstrating flexibility of Sonic DNA®.
- Timbre and tempo manipulations would impair sonic logo recognition more than pitch transposition.

Design

- Repeated-measures experiment via a series of self-reporting surveys with an overall quantitative approach.
- 3x3 design, measuring recognisability of sonic logos with three levels of manipulation (mild, medium, severe) across three musical parameters (timbre, tempo, pitch).

Participants

- Participants (N=985) were recruited in collaboration with amp.

Materials

- Continuous recognition paradigm (Herff, Olsen & Dean, 2018).
- 20 unpublished logos, synthesised with neutral piano timbre, provided by amp and manipulated in Logic Pro.
- Timbre manipulated in accordance with the dimensional scaling of musical timbre (McAdams et al., 1995), selecting a further distance from the piano timbre from mild to severe.

	Timbre	Pitch	Tempo
Mild	Harp	Transposed up **or** down a major second	x 1.5 **or** x 1/1.5
Medium	Harpsichord	Transposed up **or** down an augmented fourth	x 2 **or** x 1/2
Severe	Bassoon	Transposed up **or** down a compound augmented fourth	x 2.5 **or** x 1/2.5

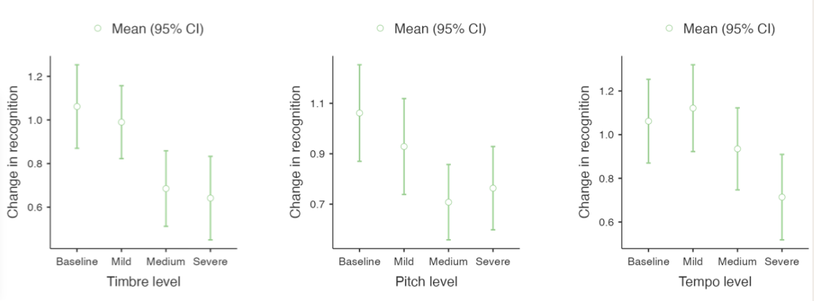
Procedure

- Participants listened to series of sonic logos in randomised order and asked to rate how confident they were that they had heard each logo before, using a 7-point Likert scale.
- Survey 1 established a baseline recognition score for each sonic logo (no manipulations). Each logo played twice at some point in the survey, resulting in 40 trials.
- Surveys 2-10 followed the same design but on second playing of each logo, the melody was manipulated in one musical parameter.

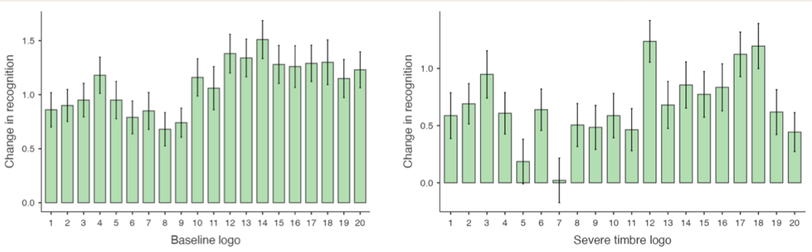
Results

- Significant difference in baseline survey between first and second playing of a sonic logo ($t(95) = 11.2$, $p < .001$).
- Significant difference in change in recognition between manipulation levels ($\chi^2(2) = 13.3$, $p = .001$) with recognition decreasing with increased manipulation.
- Recognition scores were above neutral (>4) after mild manipulation, but below neutral (<4) after severe and medium manipulation.
- Tempo and timbre both had significant effects on recognition ($p < .05$), but pitch was not significant ($p = .131$).

Mean change in recognition across manipulation level, in timbre, pitch, and tempo (left to right)



Mean change in recognition of all 20 sonic logos in baseline study (left), compared with severe timbre manipulation (right)



Discussion

- The continuous recognition paradigm can quantify recognition of sonic logos.
- Participants were less able to recognise a sonic logo the more severely it was manipulated.
- Proposed boundary of variability at medium manipulation level: participants could not confidently recognise melodies when manipulated at medium/severe levels but scored above neutral at mild.
- Manipulation in pitch affects recognition less than manipulation in timbre or tempo.

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