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Assessment of spatial lingual tactile sensitivity using a gratings orientation test.

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TITLE:

Assessment of Spatial Lingual Tactile Sensitivity using a Gratings Orientation Test.

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SUMMARY:

This work illustrates a standard procedure and threshold determination by the R-index to assess spatial lingual tactile sensitivity using a gratings orientation test.

ABSTRACT:

Individual thresholds by R-index estimates are calculated using a gratings orientation test (6 different tools of increasing grating size from 0.20–1.25 mm) to assess spatial lingual tactile sensitivity. During the experiment, the subjects are blindfolded and asked to specify the orientation of the grating (either horizontal or vertical) placed on the tongue. R-index is based on Signal Detection Theory (SDT), and it is an estimated probability of correctly identifying a target stimulus (the signal, e.g., the correct orientation) compared to an alternative stimulus (the noise, e.g., the incorrect orientation). Once the R-index values for each subject and each tool dimension are calculated, it is possible to derive the individual threshold by interpolating the two R-indices immediately below and above the established cut-off (typically 75%) based on one-sided R-index critical values. This procedure can be helpful in the medical field to study the association between oral tactile sensitivity, speech clarity, and swallowing disorders, as well as in sensory and consumer studies to explore individual variation in texture perception, food preferences, and eating behavior.

INTRODUCTION:

The texture and mouthfeel of food play an important role in liking[1–4,] and while research has found differences in texture perception due to factors such as chewing behavior[2,5], saliva flow, and composition[6,7], there are limited methods available to assess variation in oral tactile

receptors (mechanoreceptors). The oral cavity houses different types of mechanoreceptors found in the mouth: Merkel receptors, Ruffini cylinders, and Meissner corpuscles[8]. Mechanoreceptors can be classed into two groups: slowly adapting and rapidly adapting. Slowly adapting mechanoreceptors (Ruffini cylinders and Merkel receptors) produce signals continuously while being stimulated. In contrast, rapidly adapting mechanoreceptors (Meissner's corpuscles) respond to the beginning and end of stimulation with a signal. Tactile acuity varies widely across tongue surfaces and between individuals, possibly due to differences in mechanoreceptor sensitivity. The location and the number of mechanoreceptors in the oral cavity, the differences in the spatial arrangement/density of the mechanoreceptors (spatial acuity), or the differences in their sensitivity when activated could be the cause of this intra- and inter-individual variability. Several methods to evaluate and screen for variation in mechanoreceptor sensitivity in the oral cavity have been published, including von Frey filaments[9,10], letter recognition[11,12], grating orientation tests[13,] and flexible electrode array[14,15]. The gratings orientation test requires square gratings (**Figure 1**, **Figure 2**) with different groove widths to be placed on the tongue of a blindfolded subject. They indicate if subjects perceive the gratings to be in either a horizontal or vertical orientation. Responses are used to calculate average thresholds based on the subject's ability to discriminate the orientation for the different grating sizes.

PROTOCOL:

An informed, written consent has been signed by all participants. This study was approved by the Ethics Committee of the University of Milan (n. 48/19) and conducted in accordance with the Declaration of Helsinki.

1. Training of experimenters

1.1. Take the grating tool and apply a force of 100 g on a sponge placed on a scale.

NOTE: Refer to **Figure 1** for the schematic of the grating tool used in this study

1.2. Repeat this procedure at least 10 times to reduce variation in the force applied by the grating on the subjects' tongues during testing, both within and across experimenters.

2. Assessment procedure

NOTE: Conduct the assessment of tactile acuity following the required health and safety standard to guarantee the subject's safety (e.g., mask, gloves, and lab coat).

2.1. Display all gratings (0.20 mm, 0.25 mm, 0.50 mm, 0.75 mm, 1.00 mm, 1.25 mm) (**Figure 2**) on a table out of sight of the participant.

2.2. Seat the participant in a comfortable chair and inform them that they can leave the experiment at any time.

2.3. Inform the participant that they will be blindfolded during the experiment and asked to stick out their tongue in a comfortable and relaxed way.

2.4. Prior to the beginning of the experiment, familiarize the subjects with the procedure using the largest grating (1.25 mm) to demonstrate the force applied (100 g for 3 s).

2.5. Notify the participants that they can take a sip of water whenever deemed appropriate.

2.6. Apply each grating onto the subjects' tongue (anterior region of the tongue just around the midline).

2.7. After each touch, ask the subjects to indicate, using their hands, the tool's orientation (either horizontal or vertical) and their degree of sureness (sure, unsure). Subjects must guess if they do not know.

2.8. After each touch, record all the answers (horizontal, vertical, sure, not sure) for each subject on a spreadsheet (**Supplemental Table 1**).

2.9. Repeat each grating as many times as deemed necessary for the R-Index cut-off selected, for instance, 6 times, 3 horizontally, and 3 vertically (**Supplemental Table 1**).

2.10. Sterilize each grating after testing each participant (refer to section 4).

NOTE: The tongue should protrude gently from the mouth without effort by the volunteers to avoid excessive fatigue, which would lead to an alteration in their performance results. It is important to note that the higher the repetitions by grating, the more reliable the measurement[16].

3. Cleaning protocol

3.1. Prepare a solution consisting of 20 mL of sodium hypochlorite (see **Table of Materials**) diluted in 1 L of water according to the manufacturer's instructions.

3.2. Manually shake the solution for a few seconds.

3.3. Fill 6 cups with approximately 20 mL of the disinfectant solution to fully immerse each tool in the solution.

3.4. Place each tool in the corresponding cup.

3.5. Let the tools soak for 15–20 min.

3.6. Rinse the tools with plenty of water according to the manufacturer's instructions and

scrub them with a toothbrush to ensure removing any sodium hypochlorite residue.

3.7. Allow the tools to air dry.

4. R-index calculation

4.1. Create a response matrix for each volunteer and for all the tools (**Figure 3**) based on the response frequencies used to calculate the R-index using the following equation:

$$R = \frac{a(f+g+h) + b(g+h) + ch + \frac{1}{2}(ae + bf + cg + dh)}{(a+b+c+d) * (e+f+g+h)}$$

NOTE: R-index expresses individual tactile sensitivity for each tool[16]. R- index is based on SDT[17] and represents an estimated probability of discerning a target stimulus (i.e., the signal) from an alternative stimulus (i.e., the noise). The signal and the noise correspond to the correct or incorrect identification of the horizontal-vertical orientation of the grating. Four response options for both signal and noise can occur: "horizontal-sure", "horizontal-unsure", "vertical-unsure" and "vertical-sure"[16]. R-index values range between 0–1. A higher R-index value indicates better discrimination.

5. Sensitivity and threshold determination by the R-index estimates

5.1. To determine whether a subject can discriminate the orientation of each tool, calculate the cut-off using a table of critical values for R-index significance tests[18]

NOTE: Considering the present example, corresponding to 36 presentations (i.e., each grating presented 6 times, 3 horizontal and 3 vertical), the cut-off value for discrimination is set to 0.7426 according to the one-sided R-index critical values for $\alpha = 0.05$[18].

5.2. If a sufficiently high number of tools is used (e.g., six different grating dimensions)[19], derive R-index threshold estimations.

5.3. To calculate the threshold for each subject, interpolate the two R-indices immediately below and above of the cut-off[20]

REPRESENTATIVE RESULTS:

A total of 70 healthy adults (age range = 19–33 years; mean age = 22.0; 52.9% women) were involved in the study, as shown in Appiani et al. (2020)[21].

As an example, the R-index distribution by age for square 0.75 mm is reported in **Figure 4**. Each point represents a different subject. Subjects above the dotted line (cut-off value: 0.7426) are those who correctly identify the orientation of the grating (more sensitive).

The performance for the six gratings and the derived R-index threshold estimate of one subject is reported in **Figure 5**. In this case, the threshold corresponds to 0.99 mm. Subjects with low threshold values are able to recognize a smaller bar size (more sensitive), while subjects with high threshold values require more input (larger bar size) to perceive the stimulus cognitively (less sensitive)[10]. In the present case, threshold values can range from 0.20–1.25 mm. Nevertheless, two extreme values can be achieved: subjects with a threshold <0.20 mm are those able to recognize the orientation of the squares from the smallest size (0.20 mm). Conversely, those participants who recorded a threshold >1.25 mm are unable to discriminate any of the grating sizes. An example of a threshold dataset is reported in **Supplemental Table 2**.

FIGURE AND TABLE LEGENDS:

Figure 1: Description of the tools. Square schematic drawing

Figure 2: Squares with increasing-sized grooves/bars. The figure shows the six gratings, ranging from the smallest (0.20 mm) to the largest (1.25 mm).

Figure 3: Response matrix. The figure shows the response matrix used to calculate the R index. Signal (S) and noise (N) correspond to the horizontal and vertical orientation, respectively. Letter from “a” to “h” are integers taking values between 0 and 3.

Figure 4: R-index distribution by age for square 0.75 mm. The dotted line represents the cut-off value (0.7426). Subjects that are above the dotted line are those that correctly identify the orientation of the tool.

Figure 5: Individual threshold calculation. R-index values of one subject and calculation of the relevant threshold.

Supplemental Table 1: **An example of a spreadsheet used by the experimenters to record the participants’ responses**. The first column (Trial No.) represents the number of presentations; as an example, 36 possible presentations are reported. The second column (combination) indicates the size of the grating (G) and the orientation (HORIZ./VERT.). The investigator reports the subject’s answer in the column “Answer” (Horizontal/Vertical) and indicates the degree of sureness using the last column (Sure/Unsure).

Supplemental Table 2: The dataset used to calculate individual thresholds. The first three columns report the identification code, the age, and the gender for each subject. Columns 4–9 report the R-index values for each tool. In bold are reported the values immediately above and below the cut-off that have been used for the calculation of individual thresholds through interpolation (last column).

DISCUSSION:

Few valid instruments are available for measuring tactile acuity[10,11,13,22]. Von Frey filaments have been shown to be an adequate method for measuring both skin and oral tactile acuity [10,21,22].

However, these instruments measure a different dimension of lingual tactile acuity than the gratings orientation test[21]. Von Frey filaments measure contact detection while gratings spatial resolution sensitivity. These two different sensory functions are subserved by different neural mechanisms[23–25].

Other known tools are the JVP domes (Stoelting Co, Wood Dale, IL, USA), which are very similar to those used in the present procedure. However, these tools are mainly used to measure tactile acuity of the skin, as they have lower sensitivity (from 0.35–3.00 mm) than the average spatial resolution at the tongue (0.58 mm)[13]. For this reason, Appiani et al. (2020)[21] evaluated the cognitive and perceptive suitability of the custom-made gratings used in this protocol, which have additional groove widths of less than 0.50 mm (i.e., 0.20 and 0.25 mm) in order to include a range of dimensions more suitable for the assessment of oral tactile sensitivity[21]. The tool consists of polytetrafluoroethylene machine-cut square blocks of 1 cm^2 engraved with gratings on their surface. Each square has a 5 mm height and is held by a narrow cylindrical rod (2 cm long) (**Figure 1**). Both the bar size and the distance between each bar (the groove width) vary across squares but are consistent within a square. The groove depth increases by 1.5 times the groove width to ensure that the tongue does not touch the bottom of the square during testing[13]. The number of squares used to evaluate subjects' sensitivity can vary, as can the size of the bars, but previous research has found that six squares that vary in the smallest bar sizes, ranging from 0.20 mm to 1.25 mm, are needed to provide discrimination across individuals for the tongue[13,24] (**Figure 2**).

In the present procedure, the calculation of an index (the R-index) to assess the oral discrimination of a specific grating size is suggested. Furthermore, if the number of tools is large enough (e.g., six tools), the present procedure reports the calculation of individual thresholds in accordance with Robinson and colleagues[20].

This protocol shows a valid, easy, and fast way of measuring tactile acuity at the level of the tongue. However, some challenges that can affect the reliability of the test should be pointed out[21]. In general, the instruments' reliability can be affected by the experimenter. Therefore, careful training and calibration of the experimenters should be guaranteed to exert a consistent and standardized force on the subject's tongue. In addition, the involuntary movements of the lingual muscle and the dryness of the lingual surface can affect the measurements. Thus, the volunteers who have to hold their tongues outstretched for a relatively long time are requested to concentrate considerably. The occurrence of these limitations varies greatly across individuals. However, it can be reduced by suggesting that the subjects keep the tongue relaxed between the teeth and lips and possibly place the chin on the hands. Moreover, volunteers are invited to stop several times during the test to drink some water.

Future studies could look in-depth at the association between individual lingual tactile acuity, food preferences, food choices, and nutritional status. This protocol may also be useful in a clinical setting to study vulnerable populations with swallowing or oral cavity disorders.

ACKNOWLEDGMENTS:

We acknowledge all the participants, volunteers, and others involved in the study. This research was funded by the University of Milan, Piano di sostegno alla ricerca 2018.

DISCLOSURES:

The authors have nothing to disclose.

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Figure 1

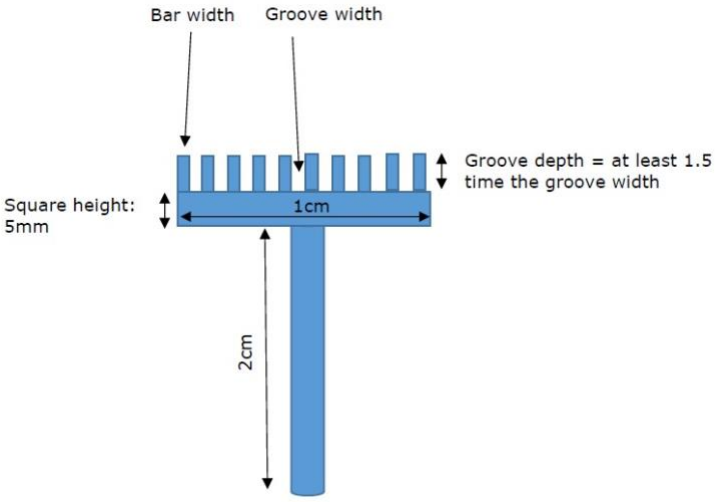

Figure 2

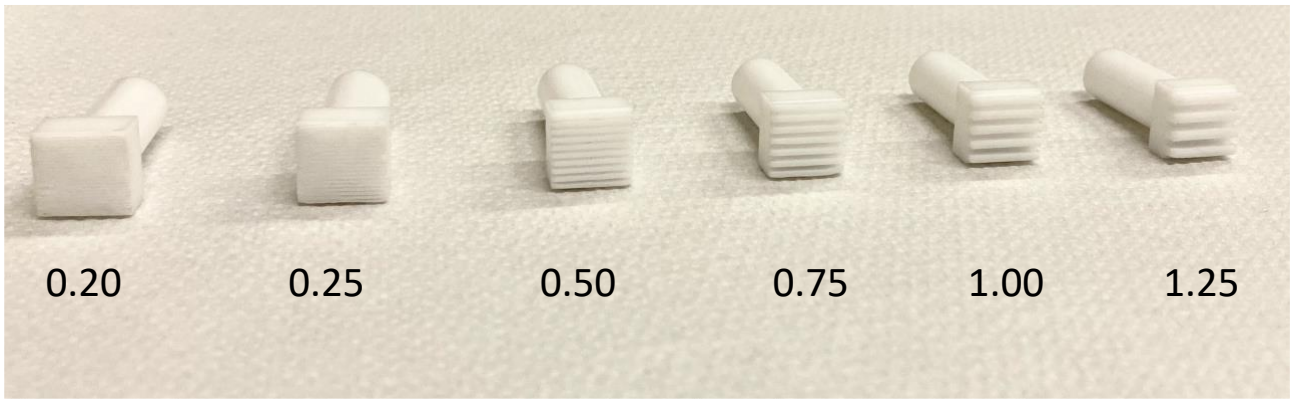

Figure 3

		Response options			
		S 'sure'	**S 'unsure'**	**N 'unsure'**	**N 'sure'**
Stimulus (Squares)	**Signal** (horizontal orientation)	a	b	c	d
	Noise (vertical orientation)	e	f	g	h

Figure 4

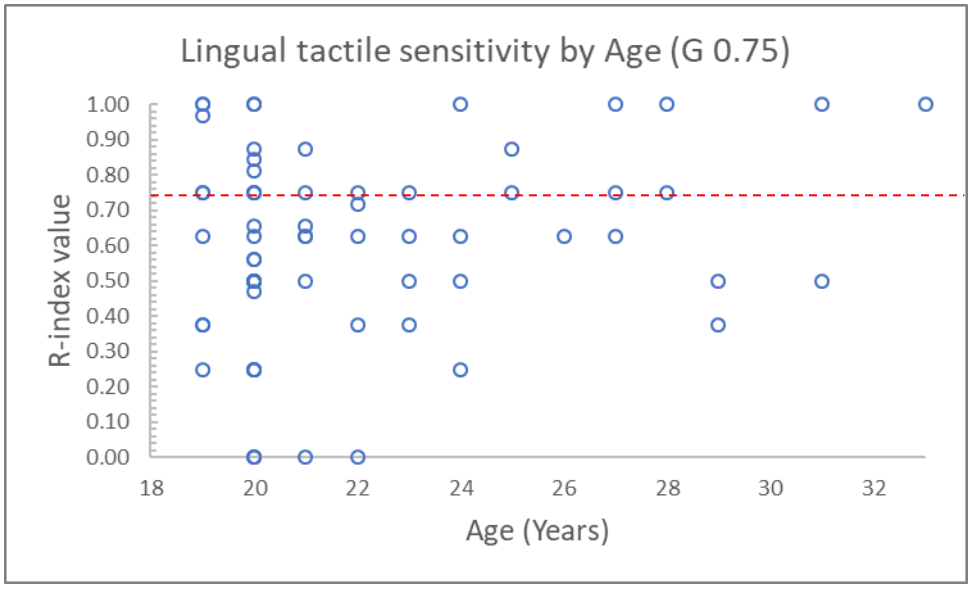

Figure 5

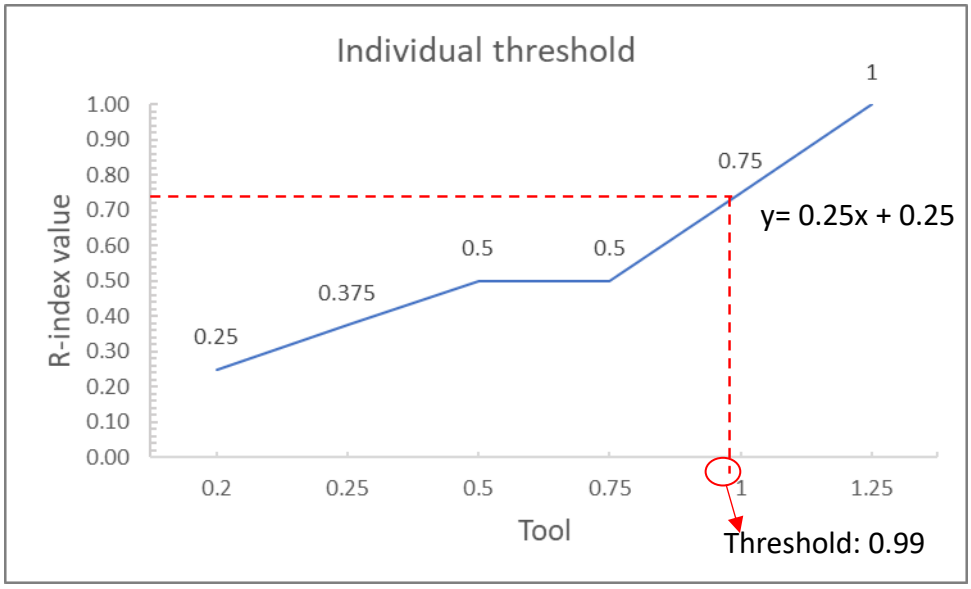

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Table of Materials

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Please note that the reviewers raised some significant concerns regarding your method and your manuscript. Please revise the manuscript to thoroughly address these concerns and all the editorial comments. Additionally, please describe the changes that have been made or provide explanations if the comment is not addressed in a rebuttal letter. We may send the revised manuscript and the rebuttal letter back to peer review.

Editorial comments:

Changes to be made by the Author(s):

Thank you for your time to review the paper, and the valuable comments and questions raised.

1. Please take this opportunity to thoroughly proofread the manuscript to ensure that there are no spelling or grammar issues. Please define all abbreviations at first use and use American English.

Done

2. Please sign the UK ALA.

Done

3. Please revise the following lines to avoid overlap with previously published work: 100-101, 119-126, 128, 152-153, 198-200, 219-224, 226-228.

Done, all the possible overlap has been replaced (93-104, 122-123, 127-128, 154-155, 199-200, 219-227)

4. Please revise the text, especially in the protocol, to avoid the use of any personal pronouns (e.g., "we", "you", "our" etc.).

Done

5. Please ensure that all text in the protocol section is written in the imperative tense as if telling someone how to do the technique (e.g., “Do this,” “Ensure that,” etc.). The actions should be described in the imperative tense in complete sentences wherever possible. Avoid usage of phrases such as “could be,” “should be,” and “would be” throughout the Protocol. Any text that cannot be written in the imperative tense may be added as a “Note.” However, notes should be concise and used sparingly. Please include all safety procedures.

Done

6. Please note that your protocol will be used to generate the script for the video and must contain everything that you would like shown in the video. Please ensure you answer the “how” question, i.e., how is the step performed? Alternatively, add references to published material specifying how to perform the protocol action. There should be enough detail in each step to supplement the actions seen in the video so that viewers can easily replicate the protocol.

Done

7. Please format the manuscript as: paragraph Indentation: 0 for both left and right and special: none, Line spacings: single. Please include a single line space between each step, substep and note in the protocol section. Please use Calibri 12 points and one-inch margins on all the side. Please include a ONE LINE SPACE between each protocol step and then HIGHLIGHT up to 3 pages of protocol text for inclusion in the protocol section of the video.

Done
8. Did you have any inclusion criteria for your subjects? Did you get their consent?
This information has been reported in the text (see lines 61-63)
9. Please see if you can move the R-index formula in Fig 4 into the text and remove that figure.
Done
10. As your supplementary files are tables, call them Supplemental Table S1 and S2 and provide titles besides descriptions for them in the figure and table legends section.
Modified
11. Please include an Acknowledgements section, containing any acknowledgments and all funding sources for this work.
Done
12. Please sort the Materials Table alphabetically by the name of the material.
Done

Reviewers' comments:

Reviewer #1:

Manuscript Summary:
Assessment of spatial lingual tactile sensitivity using a gratings orientation test. This manuscript correctly describes how to measure individual tactile thresholds using a grating orientation test. The procedure is clear and easily reproducible. The figures and the supplementary files are coherent and useful to reproduce the experiment. I only have some minor comments, listed below.
Thank you for your time to review the paper, and the valuable comments and questions raised.

Major Concerns:
None

Minor Concerns:
1.Paragraph 5.4 of R-INDEX calculation is not clear enough. Maybe, a circle in figure showing the cut-off value for the discrimination could be helpful.
Done
2. Lines 202-205: this sentence can be tricky. Consider rephrasing that, maybe splitting it into two sentences.
The sentence has been rephrased to improve readability (see lines 203-204)
3. Figure 6-7: please, use dots instead of comas on the axes X and Y of the graph.
Done

Reviewer #2:

Manuscript Summary:

This is an Interesting article that could potentially be useful in helping determine lingual mechanosensation in people. However, there are several issues with the manuscript that need to be addressed.

Thank you for your time to review the paper, and the valuable comments and questions raised.

Major Concerns:

The authors need to more thoroughly review the literature on mechanosensation of the tongue. They mischaracterize Merkel cell neurite complexes as well as Ruffini and Meissner corpuscles and ignore a large body of literature using electrotactile stimulation to investigate mechanoreceptor identity and distribution in the tongue. In addition, reports indicate that the orientation of stimuli affects discrimination ability, and this would likely affect results and should be discussed. Importantly, the acuity of mechanoreceptors varies widely across the tongue surface and the consistent location of the tool they describe is very critical. Placement is not mentioned in the protocol at all. For more specific comments, please see below.

1. line 44-45 the characteristics of the different types of mechanoreceptors are switched. Merkel receptors are slowly adapting and Ruffini and Meissner corpuscles are rapidly adapting in contrast to the author's description.

Thank you for the comment. The typo has been corrected (see lines 44-45).

2. The authors neglect to mention the broad literature using electrotactile stimulation to study mechanoreceptors in the tongue (lines 49-52 e.g., Bach-y-Rita et al., 1998, Tyler et al., 2009; Moritz et al. 2017) These studies and others also indicate that discrimination varies widely across the tongue surface and between individuals and the orientation of the stimulus impacts discrimination.

Thank you for this literature of which we were indeed unaware. This has now been added (please see lines 44-53).

3. Training of experimenters should include exact location of the tool since the ability of anterior tongue regions to discriminate stimuli is much better than more posterior regions; the area just around the midline also typically has better acuity. Even small distances make a huge difference.

We agree that this information is important to report and we added it to the text (see lines 93-94).

Minor Concerns:

1. How did the researchers determine the height of the bars and support the idea that increasing the groove depth by 1.5 times the groove width would prevent the tongue from reaching the bottom of the square? This assumption is based on previous studies. In order to avoid any misunderstanding a reference has been provided (see line 71).

Protocol

2. Did the subjects fill out informed consent paperwork? If so, this should be included

This information has been added (see lines 61-63)

3. Are the investigators confident the blindfold prevented seeing the orientation of the squares prior to testing?

Yes, the authors are confident regarding this aspect, the masks chosen allowed to prevent any kind of bias during the evaluation. Moreover, the experimenters' act prevented the possibility to identify the tool's orientation by the subjects.

4. Lines 154 and 155, "square size" should be replaced with "bar size" or "groove size" or "grating" since the size of the squares is consistent and not being tested.

Done

Supplemental Table 1

Trial No.	Combination	Answer	Sureness
1	G1.00 HORIZ.		
2	G0.50 VERT.		
3	G0.20 HORIZ.		
4	G1.00 HORIZ.		
5	G0.75 VERT.		
6	G0.25 HORIZ.		
7	G1.25 VERT.		
8	G0.50 VERT.		
9	G0.20 VERT.		
10	G1.00 VERT.		
11	G1.25 VERT.		
12	G0.20 HORIZ.		
13	G0.50 VERT.		
14	G0.25 HORIZ.		
15	G 0.50 HORIZ.		
16	G0.75 VERT.		
17	G1.00 VERT.		
18	G1.25 HORIZ.		
19	G 0.20 VERT.		
20	G0.50 HORIZ.		
21	G1.00 VERT		
22	G0.25 VERT.		
23	G0.75 VERT.		
24	G0.20 VERT.		
25	G0.25 HORIZ.		
26	G0.75 HORIZ.		
27	G0.50 HORIZ.		
28	G1.25 HORIZ.		
29	G0.75 HORIZ.		
30	G0.20 HORIZ.		
31	G1.00 HORIZ.		
32	G1.25 VERT.		
33	G0.25 VERT.		
34	G0.75 HORIZ.		
35	G1.25 HORIZ.		
36	G0.25 VERT.		

Supplemental Table 2

				INCREASING	
CODE	**AGE**	**SEX**	**R-INDEX G0.2**	**R-INDEX G0.25**	**R-INDEX G0.5**
A001	20	M	0.67	0.33	**0.22**
A002	24	M	0.00	0.50	0.50
A003	21	M	0.56	0.44	0.17
A004	29	F	0.75	0.63	0.00
A005	28	F	0.38	0.75	0.61
A006	23	F	1.00	0.75	0.38
A007	20	F	0.75	0.00	0.11
A008	21	F	0.50	0.38	**0.50**
A009	21	F	0.61	0.39	0.22
A010	19	F	1.00	0.00	0.25
A011	21	F	0.25	0.38	0.06
A012	20	M	**0.50**	**0.88**	0.75
A013	27	M	**0.22**	**1.00**	0.61
A014	20	M	0.38	0.63	0.50
A015	19	F	0.50	0.25	0.50
A016	24	F	0.75	0.50	0.75
A017	19	M	0.50	0.33	0.78
A018	28	M	0.75	1.00	0.38
A019	19	F	0.50	0.13	0.22
A020	19	M	0.00	0.50	0.25
A021	20	F	0.44	**0.50**	**0.89**
A022	22	M	0.75	**0.25**	**1.00**
A023	20	F	0.88	0.13	0.50
A024	20	M	1.00	0.75	1.00
A025	20	M	0.56	0.39	0.61
A026	31	F	0.50	0.38	0.50
A027	27	M	1.00	1.00	0.83
A028	26	F	0.63	0.88	0.50
A029	20	F	0.50	0.50	0.50
A030	20	F	0.13	1.00	0.38
A031	29	M	0.50	0.63	0.25
A032	20	F	0.50	0.50	1.00
A033	21	M	0.75	0.75	0.00
A034	20	F	0.50	0.63	0.72
A036	20	M	0.72	0.33	0.56
A037	23	M	0.25	0.25	0.25
A038	20	M	0.13	0.50	0.72
A039	20	F	0.88	0.38	0.75
A040	20	F	1.00	1.00	0.17
A041	22	F	0.63	0.13	0.75
A042	21	F	0.75	0.50	0.61

A043	25	F	1.00	0.50	0.75
A044	19	M	0.39	0.50	**0.61**
A045	20	M	1.00	0.00	0.50
A046	20	M	0.75	0.13	0.89
A047	22	F	0.25	0.63	0.50
A048	20	M	0.33	0.11	**0.33**
A049	21	F	0.88	0.63	0.25
A050	20	F	0.38	0.88	0.17
A051	19	F	0.50	0.38	0.50
A052	22	M	0.67	0.50	0.17
A053	23	M	0.50	0.88	0.63
A054	20	M	0.00	0.25	0.61
A055	19	M	0.63	0.75	1.00
A056	25	M	0.50	0.83	**0.44**
A057	20	M	0.75	0.75	1.00
A058	19	F	1.00	0.50	**0.00**
A059	22	F	0.63	0.38	0.75
A060	20	M	0.61	0.50	0.89
A061	20	F	1.00	0.00	0.75
A062	23	M	**0.25**	**1.00**	0.78
A063	31	F	0.75	0.50	0.25
A064	20	M	0.67	0.28	0.28
A065	33	F	0.63	**0.63**	**0.75**
A066	27	F	0.00	0.25	0.50
A067	20	M	0.63	0.50	1.00
A068	24	F	0.13	0.50	0.00
A069	24	F	0.38	0.75	**0.38**
A070	20	F	1.00	0.38	0.67
A071	20	M	0.25	0.38	0.50

SIZE OF TOOLS →

R-INDEX G0.75	R-INDEX G1.00	R-INDEX G1.25	THRESHOLD
0.88	0.75	0.94	0.70
0.50	**0.75**	1.00	0.99
0.63	1.00	0.67	> 1,25
0.50	0.50	0.25	> 1,25
0.75	0.38	0.50	> 1,25
0.50	0.25	0.00	> 1,25
0.75	0.50	0.13	> 1,25
0.88	0.75	1.00	0.66
0.66	**0.88**	0.67	0.85
0.38	0.75	0.50	> 1,25
0.00	1.00	0.38	> 1,25
0.75	1.00	0.25	0.23
0.75	0.75	1.00	0.73
0.50	1.00	0.63	> 1,25
0.25	1.00	0.00	> 1,25
0.63	0.63	0.38	> 1,25
0.63	0.63	0.56	> 1,25
1.00	**0.25**	**1.00**	1.16
0.38	1.00	0.63	>1,25
0.75	0.38	0.63	> 1,25
1.00	0.75	0.67	0.39
0.00	1.00	1.00	0.41
0.50	**0.50**	**1.00**	1.12
0.50	0.88	0.25	> 1,25
0.47	0.69	0.39	> 1,25
0.50	0.25	0.25	> 1,25
1.00	0.75	1.00	< 0,2
0.63	**0.50**	**0.88**	1.16
0.56	0.59	0.72	> 1,25
0.25	**1.00**	0.88	0.91
0.38	0.75	0.25	> 1,25
0.56	**0.84**	**1.00**	0.83
0.63	0.75	0.25	> 1,25
0.50	**0.75**	0.75	0.99
0.25	0.13	0.72	> 1,25
0.63	**0.75**	0.75	0.98
0.00	**0.50**	**1.00**	1.12
0.50	0.38	0.13	> 1,25
0.63	0.44	0.39	> 1,25
0.38	0.13	0.50	> 1,25
0.75	0.75	0.63	> 1,25

0.75	**0.50**	**0.75**	1.24
0.97	0.75	1.00	0.59
0.75	**0.63**	**0.75**	1.23
0.25	**0.38**	**1.00**	1.15
0.75	**0.50**	**1.00**	1.12
0.84	0.88	0.83	0.70
0.50	0.63	0.63	> 1,25
0.00	**1.00**	0.75	0.94
1.00	0.75	0.38	> 1,25
0.72	1.00	0.72	> 1,25
0.38	**1.00**	0.75	0.90
0.50	**0.75**	0.75	0.99
0.75	0.75	0.63	> 1,25
0.88	0.84	0.94	0.67
1.00	0.88	0.75	< 0,2
1.00	1.00	1.00	0.69
0.63	0.75	0.25	> 1,25
0.81	**0.69**	**0.83**	1.09
0.00	0.63	0.25	> 1,25
0.75	1.00	1.00	0.23
1.00	0.00	0.25	> 1,25
0.66	**0.56**	**1.00**	1.10
1.00	1.00	1.00	0.48
0.63	1.00	0.50	> 1,25
0.25	**0.75**	0.75	1.00
0.25	**0.63**	**1.00**	1.08
1.00	1.00	1.00	0.65
0.50	0.50	0.50	> 1,25
0.50	**0.75**	1.00	0.99

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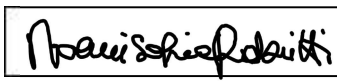
Signature:	
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