

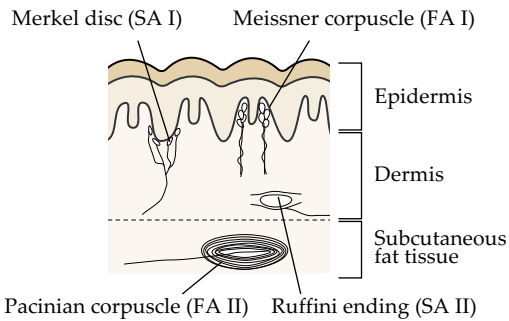


Figure S1. The mechanoreceptors in the human finger.

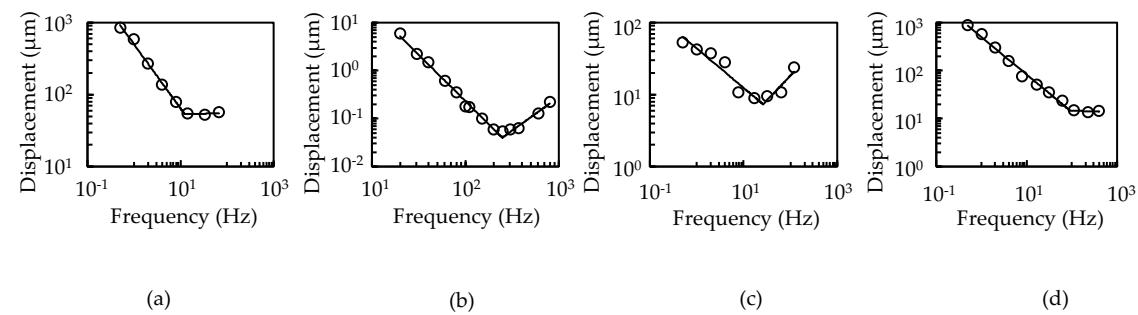


Figure S2. The physiological threshold-frequency characteristics for mechanoreceptive units, (a) FA I, (b) FA II, (c) SA I, and (d) SA II. The approximate lines represent L_m .

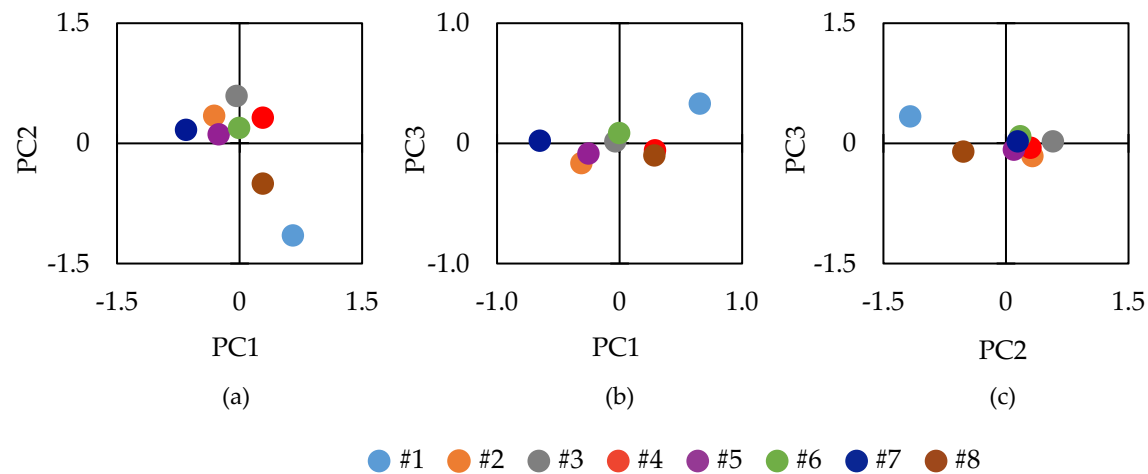


Figure S3. The relationship between the principal scores of (a) PC1 and PC2, (b) PC1 and PC3, and (c) PC2 and PC3.

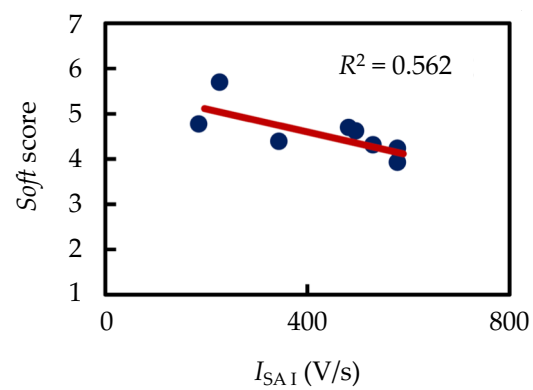


Figure S4. The relation between the SA I index value, I_{SAI} , and the evaluation score for *Soft*.

Table S1. Words used for the sensory evaluation test (terms in brackets are in Japanese).

<i>Evaluation words</i> <i>(Japanese)</i>				
<i>Rough</i> <i>(Zarazara-suru)</i>	<i>Coarse</i> <i>(Arai)</i>	<i>Moist</i> <i>(Shittori-suru)</i>	<i>Sticky</i> <i>(Hikkakari-no-arui)</i>	<i>Soft</i> <i>(Yawarakai)</i>
<i>Sleek</i> <i>(Subesube-suru)</i>	<i>Fine</i> <i>(Komakai)</i>	<i>Dry</i> <i>(Sarasara-suru)</i>	<i>Hard</i> <i>(Katai)</i>	<i>Elastic</i> <i>(Danryoku-no-arui)</i>
<i>Cold</i> <i>(Tsumetai)</i>	<i>Cool</i> <i>(Hinyari-suru)</i>	<i>Warm</i> <i>(Atatakai)</i>		

Table S2. Results obtained from the first principal component analysis.
Sticky, fine, dry, moist and *warm* do not meet the criteria listed in Sec. 2.2.

Evaluate index	PC1	PC2	PC3
<i>Sleek</i>	0.795	0.083	0.087
<i>Rough</i>	-0.766	-0.167	-0.007
<i>Coarse</i>	-0.765	-0.158	-0.032
<i>Sticky</i>	-0.638	-0.054	-0.044
<i>Fine</i>	0.619	-0.004	0.007
<i>Dry</i>	0.596	-0.192	0.147
<i>Soft</i>	0.005	0.885	-0.013
<i>Hard</i>	0.010	-0.834	0.113
<i>Elastic</i>	-0.003	0.831	0.021
<i>Moist</i>	0.293	0.551	-0.059
<i>Cold</i>	0.108	0.032	0.881
<i>Cool</i>	0.163	0.039	0.873
<i>Warm</i>	0.033	0.172	-0.590
Eigenvalue	3.37	2.55	1.70
Contribution rate (%)	23.7	20.0	14.9
Cumulative contribution rate (%)	23.7	43.7	58.6

Table S3. Results obtained from the second principal component analysis.
Sticky does not meet the criteria listed in Sec. 2.2.

Evaluate index	PC1	PC2	PC3
<i>Rough</i>	0.831	-0.069	-0.065
<i>Sleek</i>	-0.787	0.045	0.110
<i>Coarse</i>	0.786	-0.080	-0.074
<i>Sticky</i>	0.726	-0.009	-0.003
<i>Soft</i>	-0.070	0.892	0.012
<i>Hard</i>	0.057	-0.872	0.099
<i>Elastic</i>	-0.048	0.855	0.045
<i>Cold</i>	-0.060	-0.014	0.927
<i>Cool</i>	-0.124	-0.020	0.918
Eigenvalue	2.79	2.19	1.55
Contribution rate (%)	27.6	25.6	19.3
Cumulative contribution rate (%)	27.6	53.1	72.4

Table S4. Results of the stepwise linear regression analyses between the index values and *Soft* scores.

	Unstandardized coefficient β	Standardized coefficient β'	p value	Variance Information Factor (VIF)	Model summary		
					R^2	Adjusted R^2	p value
Constant	5.59		0.00001		0.562	0.489	0.032
I_{SAI}	-0.00248	-0.750	0.032	1.00			

Table S5. Results of the stepwise linear regression analyses between the index values and *Rough* scores.

	Unstandardized coefficient β	Standardized coefficient β'	p value	Variance Information Factor (VIF)	Model summary		
					R^2	Adjusted R^2	p value
Constant	-16.1		0.015		0.817	0.744	0.014
M	11.6	0.848	0.008	1.05			
$I_{FA\ II}$	0.0105	0.559	0.036	1.05			

Table S6. Comparison results of the stepwise linear regression analyses of *Soft* scores using the index values, μ' and *Ra*.

	R^2	Adjusted R^2	R^2 change	p value
Index values	0.562	0.489	0.370	0.032
μ'	0.120	-0.0270	0.525	0.401
<i>Ra</i>	0.586	0.517	0.360	0.027

Table S7. Comparison results of the stepwise linear regression analyses of *Rough* scores using the index values, μ' and *Ra*.

	R^2	Adjusted R^2	R^2 change	p value
Index values	0.817	0.744	0.470	0.014
μ'	0.0765	-0.0775	0.964	0.507
<i>Ra</i>	0.788	0.752	0.462	0.003