University of British Columbia

Social Ecological Economic Development Studies (SEEDS) Sustainability Program

Student Research Report

How an Audio Stimulus Can Alter a Person's Temperature Perception and Stress Level

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How an Audio Stimulus Can Alter a Person's Temperature Perception and Stress Level

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PSYC 421: Environmental Psychology

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Executive Summary:

How does an audio stimulus impact one's perceived temperature and stress levels? Researchers predict two potential outcomes where an audio stimulus that elicits heat will increase one's perceived temperature while decreasing stress levels. The second hypothesis states that an audio stimulus that evokes cooling sensations will decrease both perceived temperature and stress levels within a person. Through the use of a between-subjects design each participant (*n* = 251) is randomly assigned to one of three conditions: a fireplace or waterstream condition, as experimental groups, and a white noise condition being the control group. By administering a pre and post-test survey to all participants, researchers can measure the difference in temperature and stress levels through self-reported evaluations. An ANOVA test affirms both hypotheses as correct and suggests that an audio stimulus has the capability to increase or decrease both perceived temperature and stress levels.

Introduction:

The scholarly phenomenon of a placebo effect has been well-documented in its' power of treatment without administering any actual regimen. Specifically within a psychological scope, it is renowned for altering a person's belief, expectation or perception (Kirsh, 2018). Given the significant influence this effect has on people, there are many ways to integrate a placebo when attempting to change a person's perception. Lu et al., (2015) suggests that various hues of lighting are capable of manipulating perceived room temperatures, which reveals the power in one stimulus eliciting a stimulus expectancy. A stimulus expectancy is defined as an evoked expectation after being exposed to a certain stimulus (Kirsh, 2018). In the study from Lu et al., (2015), warmer toned lights inadvertently alludes people to assume a warmer temperature of a room. This finding illustrates how specific visual cues of the external environment can insinuate other aspects of the environment that the brain will blatantly assume. One plausible explanation for this can be found in the study of Munakata and Pfaffly (2004), where the researchers report how neurons that fire together, wire together. In other words, external stimuli can trigger a conditioned response through a technique called Hebbian learning (Munakata & Pfaffly, 2004). Although the abundance of literature reveals great power in a placebo where the participants are unaware of experiencing an alteration in perception, there remains a knowledge gap that should be explored further. There are insufficient amounts of studies examining how an audio stimulus, in particular, can evoke a certain response within a person.

This research aims to search for a coping mechanism, specifically for the students within the University of British Columbia (UBC), that can help build resilience against cold and hot weather that climate change entails. The researchers seek to investigate how an audio stimulus can influence perceived temperature and stress levels in order to combat the extremities of severe weather climates. There are two hypotheses that are expected to arise: 1) Students given an auditory stimulus of a burning fire will perceive their temperatures as warmer and have reduced stress levels after receiving treatment and 2) Students given an auditory stimulus of running water will perceive their temperatures as cooler and have reduced stress levels after receiving treatment.

Methods:

<u>Participants</u>

Before recruiting participants, a power analysis was run to determine the minimum number of participants required for the study to ensure that our effect was significant and not due to chance. Within our experiment, an effect size of .03, power of .95, and an alpha of .05 resulted in a minimum of 177 total participants needed in our study. In total, we were able to exceed our minimum participant requirement and, as a result, collected 251 samples (n = 251). Majority of participants were UBC students who were recruited in a variety of ways. While the demographics of our sample should reflect the diversity of the student population within UBC, our study neglected to focus on participant demographics and only collected data regarding participants' ages. The mean age of participants was found to be 20 years old.

<u>Conditions</u>

This study utilized three audio stimuli conditions as part of a between-subjects design. The three conditions consisted of a fireplace or water stream audio, as experimental conditions, and a white noise audio for the control condition. These conditions are the independent variables (IVs) and participants were randomly assigned to one of the three conditions.

<u>Measures</u>

Our study utilized two distinct dependent variables (DVs) which consist of self-reported measures of temperature and stress level. These dependent variables were intended to determine whether listening to the various audio clips of our independent variables would affect a participant's perception of temperature and stress. The DVs were operationalized through administering a pre and post-test survey to each participant. Both pre and post-test questionnaires involved the exact same 7-point Likert scale asking how stressed the individual is currently feeling, with 0 being not stressed and 7 being extremely stressed (see Appendix A). Similarly, the question asking about perception of body temperature was measured in the same manner with a likert scale having seven options ranging from extremely cold to extremely hot, with less extreme and neutral points in between.

<u>Procedure</u>

The between-subjects design was conducted exclusively online through a software called Qualtrics. Upon opening the link, a consent letter was presented to a participant, stating how participation was completely voluntary and offered the option to opt out at any point in time (see Appendix B). After consenting, participants were presented with the pretest questionnaire with the intent of establishing a baseline of initial perceived body temperature and current stress level. Following completion of the pretest survey, participants were asked to listen to a one-worded audio prompt and type in the word they heard into a textbox as a way to ensure that audio can be heard from their electronic device being used. Participants were then randomly assigned to one of the three conditions. The participants were then asked to listen to their assigned audio clip while simultaneously reading a short article (see Appendix C). The article typically took about five minutes to read, which is the same timeframe being dedicated to listening to the assigned audio clip. To ensure that participants truly took the time to read the article and listen to the assigned audio clip, the participants were given a task to write a brief summary about the article as well as typing out in a textbox the sound they heard in the audio clip all within the post-test (see Appendix D). Those who failed to properly identify the sound given in the assigned audio file were removed from the final data set as the treatment did not work on them as intended. The post-test questionnaire follows the same precedence set by the pretest and, once again, utilizes two 7-point Likert scales to measure perceived body temperature and stress. The difference in scores between the pre and post-test determined whether an individual's perceived temperature and/or stress has changed as a result of listening to their assigned audio clip. Since our survey was solely conducted online, the link was sent out through various methods online such as, sending it to friends, group chats and posting it on various forms of social media. A QR code (see Appendix E) was produced for the survey as a means of recruiting additional participants. Additionally, researchers walked around various campus locations such as the AMS Student Nest, UBC Life Building, Walter C. Koerner Library and Irving K. Barber Learning Center, kindly asking individuals to scan the QR code and complete our survey. The major challenge that occurred throughout the process of this study was getting participants to complete the survey. Many participants were eager to take part, but chose to withdraw their involvement once they had reached the assigned audio clip. The decision to utilize audio clips as our IVs may have discouraged individuals who did not have earbuds, headphones or a quiet place to complete the remainder of the task as this was part of the instructions.

Results:

To compute the change in each participants' perceived temperature and stress level, the researchers decided to calculate the differences between each participants' pre-test and post-test values by examining the questions about temperature and stress. The calculation format of the differences of each participant shows below:

$$\textit{Difference in perceived temperature} = posttest\ value - pretest\ value$$
$$\textit{Difference in stress level} = posttest\ value - pretest\ value$$

If the difference value was greater than zero, the perceived temperature or stress level had increased. On the other hand, if the difference value was less than zero, the perceived temperature or stress level decreased. If the difference value was zero, there was no change in perceived temperature or stress level after receiving treatment.

After the researchers calculated the difference of each participants' perceived temperature and stress level, a one-way ANOVA test was conducted for each DV to investigate whether the audio condition (i.e., fireplace audio, waterstream audio and white noise audio) had a measurable effect on the difference in perceived temperature and stress level. The one-way ANOVA test revealed that the temperature difference had a p-value that is less than 0.001, which is statistically significant.

[insert Figure 1.]

The descriptive table displayed the means of each conditions' difference in perceived temperature. The mean of the fireplace audio condition (C1) was 0.735, with 83 participants. The mean of the white noise audio condition (C3) was -0.259, with 85 participants. The mean of the water stream audio condition (C2) was -0.494, with 83 participants. These results suggest a significant increase in perceived temperature for the fireplace condition (C1) and the water stream audio condition (C2) had a significant decrease in perceived temperature. The descriptive plot visually illustrates the mean differences for all three conditions.

[insert Figure 2.]

In the post hoc test, it determined the mean differences between each condition. This finding suggested that fireplace audio differed from water stream audio, and the mean difference between the two conditions was 1.229. The fireplace audio condition also differed from the white noise condition, and it had a mean difference of 0.994. Lastly, the water stream audio condition differed from the white noise audio condition with a mean difference of -0.235.

[insert Figure 3.]

Based on the data above, it supports the first hypothesis which predicts that the fireplace music is effective in making participants feel warmer in comparison to the water and white noise condition. The water condition had a significant impact on evoking participants to perceive their temperatures as cooler. The one-way ANOVA on stress level difference had a p-value that was less than 0.05, which was statistically significant.

[insert Figure 4.]

The descriptive table displayed the means of each conditions' change of stress level. The mean of fireplace audio condition (C1) was -1.277 meanwhile, the mean of white noise audio condition (C3) was -0.482 and, lastly, the mean of the water stream audio condition (C2) was

-0.602. These results displayed the significant decrease in stress level for the fireplace condition (C1), and the water stream audio condition (C2) had a significant decrease in stress level too. However, the fireplace audio condition was most effective in decreasing participants' stress levels. The descriptive plot illustrated the various increments of decreases between all three conditions, suggesting that all conditions would help participants feel less stressed. Although, the fireplace audio is the most effective condition in this experiment.

[insert Figure 5.]

In the post hoc test, it determined the mean differences between each condition. This finding told the researchers that the fireplace audio condition differed from water stream audio, with a mean difference of -0.675. The fireplace audio condition also differed from the white noise condition and the mean difference was -0.795. Furthermore, the water stream audio condition differed from the white noise audio condition, with a mean difference of -0.120.

[insert Figure 6.]

This data supports our hypothesis that the fireplace and waterstream music are effective in decreasing the participants' stress levels. However, the fireplace audio is more effective and significant than the water and white noise condition. This means that the fireplace condition would make the participants feel less stressed compared to the water and white noise condition.

After the researchers did a one-way ANOVA test on the differences of both the perceived temperature and stress level variables, the researchers did one sample t-test in each condition to evaluate whether a single group differs from a known value. All the conditions' p-value was less than 0.05 and this finding suggests that each condition was significantly different from the known value that was used as a comparison. In other words, each audio condition had a significant difference from each other.

[insert Figure 7, 8, 9.]

After the researchers did a one sample t-test for each condition, a Pearson's correlations test was deployed. In this test, there was a negative correlation between students' stress level and perceived temperature. The p-value was less than 0.05, meaning that this correlation is statistically significant.

[insert Figure 10.]

These findings suggested that as perceived temperatures increased, the participants' stress level decreased and as perceived temperatures decreased, the participants' stress levels also decreased. Ultimately, these results supported both hypotheses since students who were exposed to the sound of a burning fire reported warmer temperatures and felt less stressed. Meanwhile, students who were exposed to the sound of running water felt cooler and experienced less stress afterwards.

Discussion:

The results of our research suggest that listening to the sounds of burning fire during the winter can raise people's perceived temperature and stimulate the perception of heat to combat cold weather. Similarly, listening to the sounds of running water during the summer would stimulate cooling sensations to combat extreme heat. Students can use this to their advantage as a method to building mental resilience against climate extremities rather than solely relying on external measures such as clothing or heating and cooling systems. The outcome of these changes in perceived temperatures reduces stress and contributes to better mental wellness. As a result, students would develop a higher tolerance for extreme temperatures, widening students' range of temperature comfortability. Although our results are strongly supported with the data shown, our experiment was conducted through Qualtrics which means we were unable to control the participants' environments and this could potentially confound their answers to the perceived temperature and self-reported stress level questions in the survey. Furthermore, this study was conducted during the winter. Within the water sound condition some participants who reported a decrease in perceived temperature also reported an increase in stress. This suggests that perceived decrease in temperature during the winter might add to their discomfort rather than alleviate it. This might also explain why stress decrease was not as low as the fire sound condition. To overcome this, we suggest conducting this test again during the summer for future studies. We also suggest conducting this test in person within a controlled environment to ensure that there's no actual change in the room temperature. Our research aims to help students who feel vulnerable to temperatures that they are especially not used to. International students studying abroad from tropical climates are more susceptible to having a much lower tolerance to winter and cold temperatures. Similarly, students from polar or temperate climates are less likely to tolerate high temperatures in the summer. Regardless of the season, our goal is to make the campus feel comfortable for all students at all times.

Recommendations for your UBC client:

Our recommendation is to play the audio clips of burning fire during the winter and running water during the summer in the AMS Nest. The volume of these audio clips should not exceed a level at which they become too salient and potentially distracting for students, but audible enough only when paid attention to. This can be done by playing the respective audio clips through the public address system. The PA system in the Nest is underutilized and is only used for announcements when the building is closing. Playing the audio clips throughout the day would not take away from any important announcements. Additionally, the environment is not negatively impacted by anything on which our solution depends. Buildings need to rely on heaters and air conditioning to ensure faculty, staff and students are comfortable year round. Installing these temperature regulating systems create harmful chemical byproducts (Spengler & Sexton, 1983). Although the Nest relies on passive air conditioning to cut emissions, students might not find this adequate enough for more severe climate conditions (Nest Catering & Conferences, 2020). Our solution only requires electrical consumption in the AMS Nest primarily supplied by BC Hydro (Vallenas et al., 2021). It does not produce any chemical byproducts as its only output is sonic. Ultimately, our results support the SEED's initiative to provide a more sustainable solution in encouraging climate adaptation.

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Appendix

Figure 1

P value of one-way ANOVA test in perceived temperature difference

ANOVA – Temp. Difference

Homogeneity Correction	Cases	Sum of Squares	df	Mean Square	F	p	η^2
None	Condition	70.763	2.000	35.381	55.810	< .001	0.310
	Residuals	157.222	248.000	0.634			
Welch	Condition	70.763	2.000	35.381	68.523	< .001	0.310
	Residuals	157.222	163.374	0.962			

Note. Type III Sum of Squares

Figure 1. The table above displays the p value in perceived temperature difference.

Figure 2

Descriptives of one-way ANOVA test in perceived temperature difference

Descriptives

Descriptives – Temp. Difference

Condition	N	Mean	SD	SE	Coefficient of variation
C1	83	0.735	0.682	0.075	0.928
C2	83	−0.494	0.739	0.081	−1.495
C3	85	−0.259	0.941	0.102	−3.634

Descriptives plots

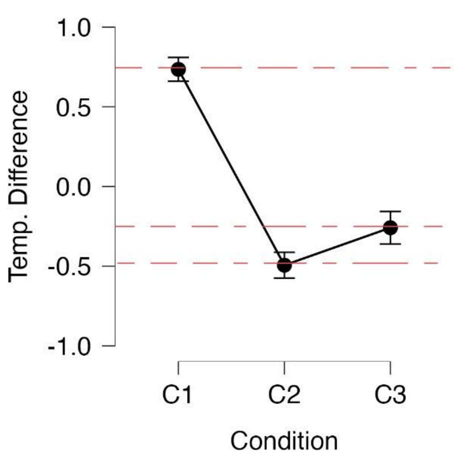

Figure 2. The table and graph above display the mean of each condition in perceived temperature difference.

Figure 3

Post Hoc Comparisons of one-way ANOVA test in perceived temperature difference

Post Hoc Comparisons – Condition

		Mean Difference	SE	t	p_{tukey}
C1	C2	1.229	0.124	9.943	< .001
	C3	0.994	0.123	8.088	< .001
C2	C3	−0.235	0.123	−1.914	0.137

Note. P–value adjusted for comparing a family of 3

Figure 3. The table above displays the mean difference of each condition in perceived temperature difference.

Figure 4

P value of one-way ANOVA test in stress level difference

ANOVA

ANOVA – Stress Difference

Homogeneity Correction	Cases	Sum of Squares	df	Mean Square	F	p	η^2
None	Condition	30.653	2.000	15.326	5.463	0.005	0.042
	Residuals	695.730	248.000	2.805			
Welch	Condition	30.653	2.000	15.326	5.883	0.003	0.042
	Residuals	695.730	164.242	4.236			

Note. Type III Sum of Squares

Figure 4. The table above displays the p value in stress level difference.

Figure 5

Descriptives of one-way ANOVA test in stress level difference

Descriptives ▼

Descriptives – Stress Difference ▼

Condition	N	Mean	SD	SE	Coefficient of variation
C1	83	−1.277	1.603	0.176	−1.255
C2	83	−0.602	1.847	0.203	−3.067
C3	85	−0.482	1.563	0.170	−3.240

Descriptives plots

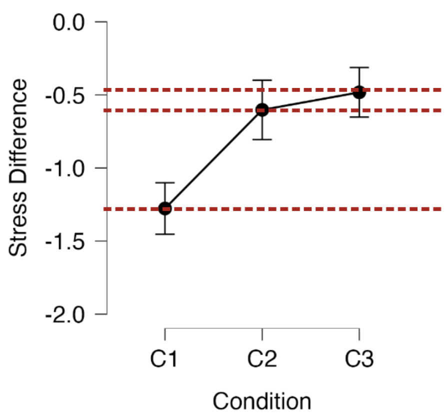

Figure 5. The table and graph above display the mean of each condition in stress level difference.

Figure 6

Post Hoc Comparisons of one-way ANOVA test in stress level difference

Post Hoc Tests

Standard

Post Hoc Comparisons – Condition

		Mean Difference	SE	t	p_{tukey}
C1	C2	−0.675	0.260	−2.595	0.027
	C3	−0.795	0.258	−3.075	0.007
C2	C3	−0.120	0.258	−0.465	0.888

Note. P–value adjusted for comparing a family of 3

Figure 6. The table above displays the mean difference of each condition in stress level difference.

Figure 7

One sample t-test in fireplace audio condition

One Sample T–Test

	t	df	p
Temp. Difference	9.814	82	< .001
Stress Difference	−7.260	82	< .001

Note. For the Student t–test, the alternative hypothesis specifies that the mean is different from 0.

Note. Student's t–test.

Figure 7. The table above displays the p value of fireplace audio condition in perceived temperature difference and stress level difference in one sample t-test.

Figure 8

One sample t-test in water stream audio condition

One Sample T–Test

	t	df	p
Temp. Difference	−6.092	82	< .001
Stress Difference	−2.971	82	0.004

Note. For the Student t–test, the alternative hypothesis specifies that the mean is different from 0.

Note. Student's t–test.

Figure 8. The table above displays the p value of water stream audio condition in perceived temperature difference and stress level difference in one sample t-test.

Figure 9

One sample t-test in white noise audio condition

One Sample T-Test

	t	df	p
Temp. Difference	−2.537	84	0.013
Stress Difference	−2.845	84	0.006

Note. For the Student t-test, the alternative hypothesis specifies that the mean is different from 0.

Note. Student's t-test.

Figure 9. The table above displays the p value of white noise audio condition in perceived temperature difference and stress level difference in one sample t-test.

Figure 10

Pearson's correlation test of temperature difference and stress level difference

Pearson's Correlations

Variable		Temp. Difference	Stress Difference
1. Temp. Difference	Pearson's r	—	
	p-value	—	
2. Stress Difference	Pearson's r	−0.166	—
	p-value	0.008	—

Figure 10. The table above displays the *Pearson's correlation and* p value of perceived temperature difference and stress level difference.

Appendix A

The pretest and post-test survey questions used to gather data on a participant's perception of current body temperature and stress level before and after listening to the assigned audio clip.

With regards to your current body temperature, how warm or cold do you feel right now?

- Extremely cold
- Shivering cold
- Slightly cold
- Just right
- Slightly warm
- Toasty warm
- Extremely hot

Are you currently feeling stressed? 0 = not stressed at all and 7 = extremely stressed

0 1 2 3 4 5 6 7

Stress level

Appendix B

The Consent letter used as part of this experimental study design. This letter was provided to the participants at the beginning of the study. Participants were required to read the letter in its entirety and agree to its terms before continuing with the study.

UNIVERSITY OF BRITISH COLUMBIA

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Consent Form

Class Research Projects in PSYC 421 - Environmental Psychology

Principal Investigator: Dr. Jiaying Zhao
Course Instructor
Department of Psychology
Institute for Resources, Environment and Sustainability
Email: jiayingz@psych.ubc.ca

Introduction and Purpose

Students in the PSYC 421 – Environment Psychology class are required to complete a research project on the UBC campus as part of their course credit. In this class, students are required to write up a research proposal, conduct a research project, collect and analyze data, present their findings in class, and submit a final report. Their final reports will be published on the SEEDS online library (https://sustain.ubc.ca/teaching-applied-learning/seeds-sustainability-program). Their projects include online surveys and experiments on a variety of sustainability topics, such as waste sorting on campus, student health and wellbeing, food consumption and diet, transportation, biodiversity perception, and exercise habits. The goal of the project is to train students to learn research techniques, how to work in teams and work with UBC clients selected by the UBC SEEDS (Social Ecological Economic Development Studies) program.

Study Procedures

If you agree to participate, the study will take about 10 minutes of your time. You will answer a few questions in the study. The data will be strictly anonymous. Your participation is entirely voluntary, and you can withdraw at any point without any penalty. Your data in the study will be recorded (e.g., any answer you give) for data analysis purposes. If you are not sure about any instructions, please do not hesitate to ask. Your data will only be used for student projects in the class. There are no risks associated with participating in this experiment.

Confidentiality

Your identity will be kept strictly confidential. All documents will be identified only by code number and kept in a locked filing cabinet. You will not be identified by name in any reports of the completed study. Data that will be kept on a computer hard disk will also be identified only by code number and will be encrypted and password protected so that only the principal investigator and course instructor, Dr. Jiaying Zhao and the teaching assistants will have access to it. Following the completion of the study, the data will be transferred to an encrypted and password protected hard drive and stored in a locked filing cabinet. Please note that the results of this study will be used to write a report which is published on the SEEDS library.

Remuneration

There is no remuneration for your participation.

UNIVERSITY OF BRITISH COLUMBIA

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Contact for information about the study

This study is being conducted by Dr. Jiaying Zhao, the principal investigator. Please contact her if you have any questions about this study. Dr. Zhao may be reached at (604) 827-2203 or jiayingz@psych.ubc.ca.

Contact for concerns about the rights of research subjects

If you have any concerns or complaints about your rights as a research participant and/or your experiences while participating in this study, contact the Research Participant Complaint Line in the UBC Office of Research Ethics at 604-822-8598 or if long distance e-mail RSIL@ors.ubc.ca or call toll free 1-877-822-8598.

Consent: Your participation in this study is entirely voluntary and you may refuse to participate or withdraw from the study at any time. You also may postpone your decision to participate for 24 hours. You have the right to choose to not answer some or any of the questions. By clicking the “continue” button, you are indicating your consent to participate; hence, your signature is not required. The researchers encourage you to keep this information sheet for your records. Please feel free to ask the investigators any additional questions that you have about the study.

Ethics ID: H17-02929

Appendix C

The part of the survey questionnaire which demonstrates how a participant would be instructed to listen to the assigned audio clip while simultaneously reading the article. While the provided audio file is approximately ten minutes in duration the intention is that the participant would only have to listen for however long it took them to read the article in its entirety. Once a participant has completed reading the article they can advance to the next portion of the survey by clicking on the arrow below.

1. You must be in a **quiet area** to complete this task! If you are not in a quiet area, relocate to a place with no background noise. Please listen to the audio below **while completing the next task**.

2. Please read this news article while listening to the audio provided.

note: you should be listening to the attached audio file while concurrently reading the news article

Article: **Toblerone chocolate is no longer 'Swiss' enough for Alps logo**

Toblerone, the chocolate bar known for its distinctive triangular peaks, is losing the Matterhorn mountain from its logo after falling afoul of strict marketing rules on "Swissness."

Future Toblerone wrappers will feature a generic mountain design instead, after the chocolate bar's American owner, Mondelez, decided to shift some production to the Slovakian capital of Bratislava from this year.

"The packaging redesign introduces a modernized and streamlined mountain logo that aligns with the geometric and triangular aesthetic," a Mondelez spokesperson told Swiss newspaper Aargauer Zeitung. Toblerone's distinctively shaped boxes will also be changed to read: "Established in Switzerland," rather than "of Switzerland."

Under the "Swissness" legislation, which came into force in Switzerland in 2017, businesses have to show their products are sufficiently "Swiss" to claim that label - which has long been associated with prestige products such as Swiss watches.

Swiss officials at the time cited studies showing that a Swiss association can add as much as 20 percent to the price tag of a product, or even more for luxury items. The label had been "much coveted and misused," officials said, at home and abroad, in a way that was damaging to its credibility.

Now, food products must get at least 80 percent of their raw materials from Switzerland to qualify as Swiss-made - or 100 percent in the case of milk and dairy products. (Cocoa is an exception, because it falls into the category of natural items that cannot be produced locally.)

Mondelez did not immediately respond to a request for comment on the branding change.

The fate of a bear pictured climbing the iconic mountain in the current logo remains unknown. (The bear is partially concealed within the logo, and some customers have apparently been surprised to learn of its existence.) Bern, the Swiss city where the Toblers first opened a candy shop in 1868, is known as the "City of Bears."

The company's website states that the more than 100-year-old chocolate bar's unique triangular shape was inspired by Swiss chocolatier Theodor Tobler's mountainous homeland - in particular, the 14,690-foot Matterhorn, one of the best-known mountains in the Alps.

The highest mountain in Slovakia - where Toblerone production is shifting - Gerlachovsky stit, is only 8,711 feet. Bratislava is sometimes referred to as "Beauty on the Danube."

It is not the first time Toblerone's iconic peaks have become ensnared in a vexed political debate. In 2016, the British government was asked to explain why Mondelez had widened the spacing between the chocolate and nougat peaks: Was it Brexit? As it turned out, no. The reduction in the weight of the bars was long-planned and due to the rising price of some ingredients, the company said at the time.

Switzerland is not the only country concerned about safeguarding the authenticity of its products. French producers fought for years to protect the name Champagne from being used by foreign producers - a spat that reared up again in 2021 in Russia.

A U.S. appeals court last week ruled that the name "Gruyere" is a common term for cheese made in America and can be used for producers outside of the Gruyère region of Switzerland and France. 3. Once you finish reading the article, press the arrow where you will be prompted to the final survey.

3. Once you finish reading the article, press the arrow where you will be prompted to the final survey.

→

Appendix D

The final portion of the survey. This section includes the textbox where participants give a brief summary of the article they have just read, followed by the post-test questions on perceived body temperature and stress (same as pretest and as seen in Appendix A). The next question asks participants to attempt to identify the sound they heard while reading the article. The final questions relate to brief demographics and general questions on an individual's satisfaction with th University of British Columbia's response to snow falls and finally the participants tolerance to cold weather.

Give a brief summary of the article on the previous page:

With regards to your current body temperature, how warm or cold do you feel right now?

- Extremely cold
- Shivering cold
- Slightly cold
- Just right
- Slightly warm
- Toasty warm
- Extremely hot

How stressed do you feel right now? 0 = not stressed at all and 7 = extremely stressed

0 1 2 3 4 5 6 7

Stress level

What sound do you think you heard in the audio file while reading the article? (this question is asking about the second audio clip and is ***not*** about the first, one-worded audio)

What is your age?

How do you feel about UBC's recent response to snow falls in Metro Vancouver?

- They do absolutely nothing to help with the snow
- It was awful and more needs to be done
- It is okay but definitely could be better
- Neutral
- It was mostly a good, positive experience
- It isn't perfect but still very good
- UBC did a perfect job

How tolerant are you with cold weather?

- Not tolerant to cold weather at all
- Somewhat tolerant to cold weather
- Quite tolerant to cold weather
- Very tolerant to cold weather

Appendix E

The QR code used to get participants to partake and complete our survey questionnaire. Individuals could scan the QR code and the survey could immediately be opened on their electronic device as long as it had a stable internet connection.