Topic: taste (culture)

2019-05-05

Article Discussed

Berns, G. S., & Moore, S. E. (2012). A neural predictor of cultural popularity. *Journal of Consumer Psychology*, *22*(1), 154–160. https://doi.org/10.1016/j.jcps.2011.05.001

Brief article summary

The topic for this week's article was Taste. Other topics were popularity, fame, infamy, reward and advertising. Themes that emerged during discussion were popularity of different genres of music, artists, political candidates, products such as food and clothing; why adolescents were used in brain studies and the methods used to obtain data for this research.

Cognitive Process Neuroimaging Analysis

Neurosynth term

"Taste"

Top 5 PubMed Articles for Term

1: Li Y, Hu Y. How to Attain a Popularity Goal? Examining the Mediation Effects of Popularity Determinants and Behaviors. J Youth Adolesc. 2018 Sep;47(9):1842-1852. doi: 10.1007/s10964-018-0882-x. Epub 2018 Jun 25. PubMed PMID: 29942986.

2: Soleymani T, Lo Sicco K, Shapiro J. The Infatuation With Biotin Supplementation: Is There Truth Behind Its Rising Popularity? A Comparative Analysis of Clinical Efficacy versus Social Popularity. J Drugs Dermatol. 2017 May 1;16(5):496-500. Review. PubMed PMID: 28628687.

3: Gommans R, Müller CM, Stevens GWJM, Cillessen AHN, Ter Bogt TFM. Individual Popularity, Peer Group Popularity Composition and Adolescents' Alcohol Consumption. J Youth Adolesc. 2017 Aug;46(8):1716-1726. doi: 10.1007/s10964-016-0611-2. Epub 2016 Nov 15. PubMed PMID: 27848127;

PubMed Central PMCID: PMC5491679.

4: Zerubavel N, Bearman PS, Weber J, Ochsner KN. Neural mechanisms tracking popularity in real-world social networks. Proc Natl Acad Sci U S A. 2015 Dec 8;112(49):15072-7. doi: 10.1073/pnas.1511477112. Epub 2015 Nov 23. PubMed PMID: 26598684; PubMed Central PMCID: PMC4679039.

5: van den Broek N, Deutz MH, Schoneveld EA, Burk WJ, Cillessen AH. Behavioral Correlates of Prioritizing Popularity in Adolescence. J Youth Adolesc. 2016 Dec;45(12):2444-2454. Epub 2015 Sep 11. PubMed PMID: 26362873.

Top 5 Neurosynth Articles for Term

de Araujo, I. E. T., Rolls, E. T., Kringelbach, M. L., McGlone, F., & Phillips, N. (2003). Taste-olfactory convergence, and the representation of the pleasantness of flavour, in the human brain. *The European Journal of Neuroscience*, *18*(7), 2059–2068.

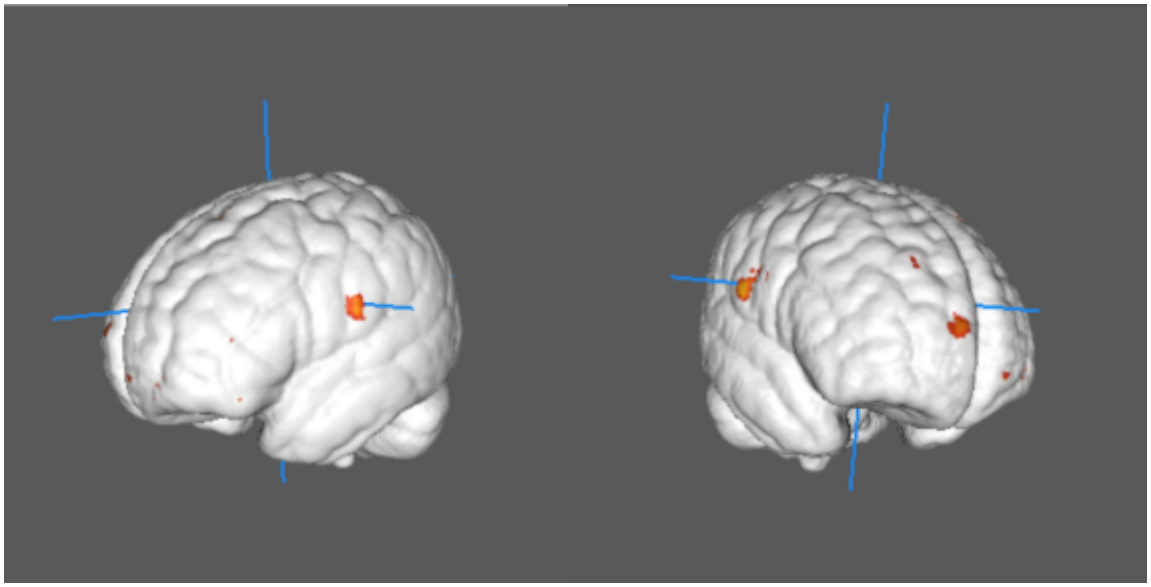
Grabenhorst, F., Rolls, E. T., & Bilderbeck, A. (2008). How cognition modulates affective responses to taste and flavor: top-down influences on the orbitofrontal and pregenual cingulate cortices. *Cerebral Cortex (New York, N.Y.: 1991)*, *18*(7), 1549–1559. https://doi.org/10.1093/cercor/bhm185

Hoogeveen, H. R., Dalenberg, J. R., Renken, R. J., ter Horst, G. J., & Lorist, M. M. (2015). Neural processing of basic tastes in healthy young and older adults - an fMRI study. *NeuroImage*, *119*, 1–12. https://doi.org/10.1016/j.neuroimage_taste.2015.06.017

Nakamura, Y., Goto, T. K., Tokumori, K., Yoshiura, T., Kobayashi, K., Nakamura, Y., … Yoshiura, K. (2011). Localization of brain activation by umami taste in humans. *Brain Research*, *1406*, 18–29. https://doi.org/10.1016/j.brainres.2011.06.029

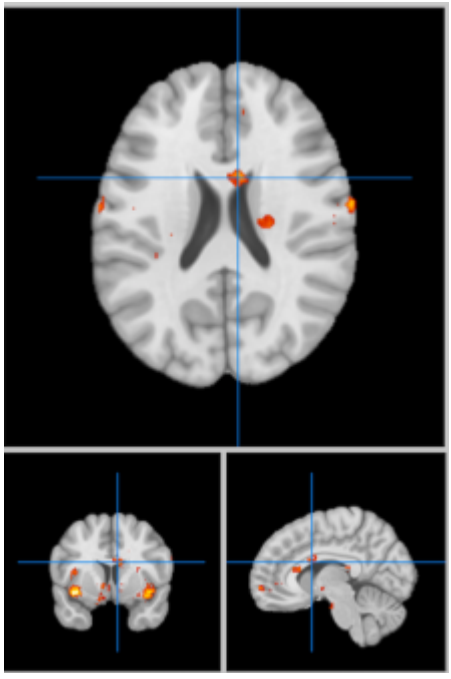
Nakamura, Y., Tokumori, K., Tanabe, H. C., Yoshiura, T., Kobayashi, K., Nakamura, Y., … Goto, T. K. (2013). Localization of the primary taste cortex by contrasting passive and attentive conditions. *Experimental Brain Research*, *227*(2), 185–197. https://doi.org/10.1007/s00221-013-3499-z

Neurosynth map for term



Brain region

Brain region: cingulate gyrus



Other Neurosynth Terms Associated with Region

Name	z-score	Posterior prob.	Func. conn. (r)	Meta-analytic coact. (r)
taste	6.74	0.9	0.03	0.07
callosum	5.83	0.87	0.21	0.07
corpus callosum	5.83	0.87	0.21	0.07
corpus	5.6	0.87	0.21	0.07
eating	4.78	0.85	0.03	0.02
retrieval	3.34	0.69	0.09	0
abilities	0	0.39	0	0
ability	0	0.51	0	0
abstract	0	0.39	-0.02	0
abuse	0	0.51	-0.02	0

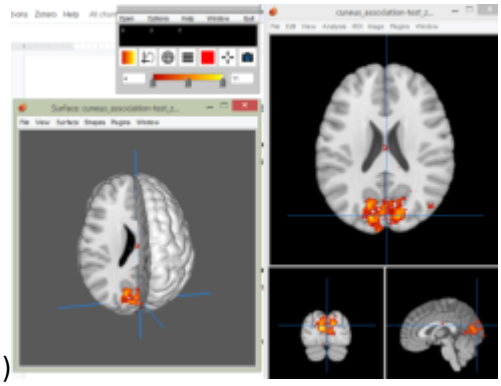
Questions posed by the class

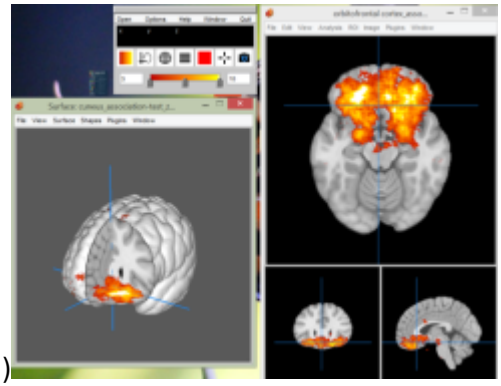
Clarifications of the article

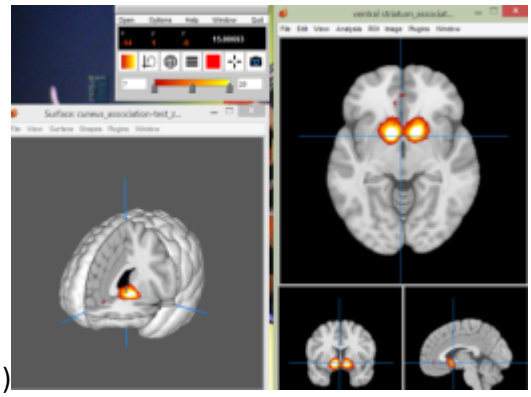
Q: Figure 1 b shows activity in three areas, cuneus, orbitofrontal cortex, and the ventral striatum. Can someone identify these regions on the fMRI?

ZeroCanary: From the side view, the activity in the lower right side of the brain is in the orbitofrontal cortex. From the same side view, the activity in the left side of the brain is in the cuneus region. From the top view, the activity in the center of the brain is in the ventral striatum.

Option temple: Yes

(1) 

(2) 

(3) 

1. Cuneus
2. Orbitofrontal cortex
3. Ventral Striatum

Q: What exactly is post factum popularity information?

SincereZigzag: Post Factum = *“After the fact.* In the study, after participants listened to the 15 second song clip for a second time, the popularity information was shown. The song's popularity was displayed in the 1–5 star scaling system. Data was extracted from the SoundScan database.

Q: What is the Nielsen SoundScan?

WindowComrade: Nielsen SoundScan is an information system that tracks sales of music and music video products throughout the US and Canada. Sales data is collected weekly from over 14k retail chains, mass merchants, online stores, venues, and outlets.The Neilsen SoundScan is the sales source for the Billboard music charts, which makes it the largest source of sales records in the music industry.

Reseach methods: participants

Q: How can you make sure that a sample is truly representative of the whole population?

ShelfOpus: First off, a representative sample is a subset of a population that seeks to best reflect the traits of a larger group. Representative samples are one of the most difficult samples to collect however they yield the best results. Ensuring that a whole population is taken into account requires using a good sampling method. It could be argued that stratified random sampling is the best way to obtain a representative sample. “Stratified random sampling examines the characteristics of a population group and breaks down the population into what is known as strata. Dividing out the population by strata helps an analyst to easily choose the appropriate number of individuals from each stratum based on proportions of the population.” Although this method is usually time consuming and more costly, it tends to result in higher quality data.

Q: Why would they use adolescent brains in the study? The brain isn’t fully developed until 25 so wouldn’t that affect the study?

RespondLlama: “Adolescents develop a capacity to hold in mind more multidimensional concepts and are thus able to think in a more strategic manner.” This article says that although the adolescent brain isn’t fully developed, that doesn’t mean that it is inferior. It is different than the adult brain but can still be used accurately in studies like the one in this week’s article.

Research methods: neuroimaging

Q: How does fMRI work? What are some benefits and drawbacks compared to other brain imaging techniques?

PolarisUnique**: “As a brain imaging technique FMRI has several significant advantages: it is non-invasive and doesn’t involve radiation, making it safe for the subject,** i**t has excellent spatial and good temporal resolution, It is easy for the experimenter to use.**

The attractions of FMRI have made it a popular tool for imaging normal brain function – especially for psychologists. Over the last decade it has provided new insight to the investigation of how memories are formed, language, pain, learning and emotion to name but a few areas of research. FMRI is also being applied in clinical and commercial settings.

Q: What are examples of susceptibility artifacts that would cause the adolescent participants to be excluded from the fMRI analyses?

RavioliJaguar: Susceptible artifacts is when distortions or local signal change due to local magnetic field inhomogeneities from a variety of compounds in the MRI scan causing unclear images for the researchers to use_taste. This would cause the participants to excluded from the fMRI analyses because sometimes artifacts can we confused with pathology and it reduces the quality of the examination. Artifacts often occur because there is a problem with the interaction between the patient and the scanner or the MRI scanner hardware itself.

Q: What else can one predict using fMRI?

SocialAnvil: In the first research article I found, they used fMRI to predict brain maturity in volunteer aged 7-30. They used connections in the brain to identify functional networks which accurately predicted brain maturity. I also looked at paper that used fMRI to predict cognitive decline, pain, language, learning, and prediction error. I think the prediction error studies are particularly cool because you can do a trust exercise with money and then observe the brain activation in people when they predict wrong or right. FMRI is very commonly used and when it can be afforded, is kind of the gold standard for psychology studies when looking at brain activity.

Brain regions and disorders

Q: What is the function of the orbitofrontal cortex?

SodaOxford: The orbitofrontal cortex contains the secondary taste cortex, which is where the reward value of taste is represented. It is also involved in motivational behavior, such as feeding and drinking, emotional behavior, and social behavior.

Q: What are some other reward-related areas of the brain and how do they interact with each other?

MobileSuperior: The mesolimbic dopamine pathway is thought to play a primary role in the reward system. It connects the ventral tegmental area (VTA), one of the principal dopamine-producing areas in the brain, with the nucleus accumbens, an area found in the ventral striatum that is strongly associated with motivation and reward. The release of dopamine motivates us to repeat behaviors or activities that prompted this release. This system's purpose was to promote survival by rewarding life sustaining behaviors such eating and procreation.

Q: Does the absence of activation in the hippocampus and right DLPFC of Pepsi drinkers means that Pepsi is not as good at advertising as Coke? I was confused about what that finding meant in the research article.

TelecomElegant: This part of the article is more so implying that while Coke and Pepsi are essentially the same drink, the individuals responses depend on the brand of the drink being offered. Pepsi-drinkers were essentially less stimulated by the thought of drinking Coke while this same thought triggered this specific region of Coke-drinker brains. I can only assume that had the beverage being offered been Pepsi, we would have seen the opposite effect with increased activation in Pepsi-drinker brains and little to no activation in Coke-drinker brains. Overall, these people who identify with Coke or Pepsi have some pretty strong feelings based on the specific brand of an otherwise pretty similar drink.

Q: What is anhedonia and how is it associated with MDD?

PaintLevel: Anhedonia is defined as the diminished capacity to experience pleasure. The Diagnostic and Statistical Manual 4th edition lists anhedonia as a significant symptom of major depressive disorder, as well as a negative symptom of schizophrenia.

Creativity, novelty, and preference

Q: Does creating something different generally cause something to be famous or infamous?

VideoSport: Intuitively, not all good, creative ideas become famous or infamous. According to Lubart's and Sternberg's Investment approach, creative ideas are imagined from a cumulation of intellectual processes, knowledge, intellectual style, personality, motivation, and environmental context. They explain that using these resources, creative people must go on to invest by "buying low and selling high"(Teigen, 1987).

Q: Does participants' preference of song genre affect how much they enjoy the song/activity in their ventral striatum?

Banditmeter: "Brain activation data revealed that broad emotion-related limbic and paralimbic regions as well as the reward circuitry were significantly more active for familiar relative to unfamiliar music. Smaller regions in the cingulate cortex and frontal lobe, including the motor cortex and Broca's area, were found to be more active in response to liked music when compared to disliked one. Hence, familiarity seems to be a crucial factor in making the listeners emotionally engaged with music, as revealed by fMRI data."

Q: Are the same neurological processes that are involved with popular music (as referenced in the article) involved in all things that become popular (phrases, fashion, home decor, etc.)?

RespondLlama: The popularity of music versus the popularity of places that people travel to (or other categories of popularity) is different in the sense that there are different variables to determine and measure (Nickerson.) For example, to determine the popularity of music a variable that needs to be studied is how the music makes people feel, but the popularity of a vacation destination is determined by accessibility and cost. Accessibility is somewhat important in obtaining music, but is imperative to a destination. The neurological process are the same (van den Broek), but the reasoning behind why something is popular is different depending on the category in question. The popularity of people is a bit more complex, and involves many social and environmental factors to determine if a person is liked and has

influence over their peers (Gommans.)

Gommans, R., Müller, C. M., Stevens, G. W. J. M., Cillessen, A. H. N., & Ter Bogt, T. F. M. (2017). Individual Popularity, Peer Group Popularity Composition and Adolescents' Alcohol Consumption. *Journal of Youth and Adolescence*, *46*(8), 1716–1726. https://doi.org/10.1007/s10964-016-0611-2

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van den Broek, N., Deutz, M. H. F., Schoneveld, E. A., Burk, W. J., & Cillessen, A. H. N. (2016). Behavioral Correlates of Prioritizing Popularity in Adolescence. *Journal of Youth and Adolescence*, *45*(12), 2444–2454. https://doi.org/10.1007/s10964-015-0352-7

Q: Do different genres of music activate different areas of the brain? For example does sad vs. upbeat music elicit different neural responses?

IsotopeNirvana: Classical: Enhances dopamine secretion and synaptic function, learning, and memory; Rap: Stimulates emotion, language, motivation, motor function, and processing; Pop/Rock: Improves endurance and enhances physical performance, also acts as a distraction; Jazz: Soothes the body.

Q: Are there studies with more concrete correlations between neural responses and cultural popularity than "largely unknown" music artists?

RespondLlama: the studies highlighted in the article are the only ones related to music artists but there are other studies related to neural response and cultural popularity related to other things, such as social networks (Zerubavel) and peer status (de Water.) In peer status, there are distinct neural and behavioral correlates for peer exclusivity. For social networks there is less concrete neural correlation because it is somewhat difficult to quantify a variable. There was a also a study on neural responses to video games and game popularity that states that lack of standardization of video game research makes it difficult to track neural responses to different types of video games (Paulus.)

Implications and ethics of the study

Q: Could popularity of political candidates be measured using the same techniques they used with Coke and Pepsi drinkers?

Ambient Benefit**:** So I couldn't find anything on if they have actually used the same technique as the one mentioned in the article reading for this week, but I did find a literature review investigating the whether political choices rely on common neural substrates. The articles that the researchers included in their "neuropolitics" section included three studies that investigated "face judgement in political contexts" and four studies investigated "motivated reasoning, political interest, attitude change in response to

advertising and automatic processing of political preference.". The fMRIs shown in the article indicated no significant overlap in brain areas for each of these studies than "would be expected by chance" (Krastev et al., 2016).

The article we read this week did talk about how it had criteria to use fMRI study for branding:

1. The study participants who are scanned have to be representative of the target population
2. Scanning has to be done before any kind of campaign is launched
3. "Metrics of brand effectiveness must be readily available for the target population" aka web page views or downloads, etc
4. What should be presented in the scanner? Campaign, actual product? This is for the researcher to decide. (Berns & Moore, 2012)

So for music, it was rather simple to apply these criteria too, and the article walks us through this process, but I imagine you could do this with political campaigns before they came out, or before anyone had seen anything about the candidates, it would just be less straightforward. Also, the ethics of this kind of test before a political campaign might be kind of questionable, as Question 25 mentions.

Q: What are the ethical concerns, if any, with using a brain studies to know what people will like before they even hear the songs?

ExactTulip: "New applications combining fMRI and real time visualization of one's own brain activity (rtfMRI) could empower individuals to modify brain response and thus could enable researchers or institutions to intervene in the modification of an individual behavior. The latter in particular, as well as the concern about the confidentiality and storage of sensitive information or fMRI and lie detectors forensic use, raises new ethical questions (di Porzio, 2016)." **While ethical studies concerning music were not very insightful, this article describes some of the issues that can arise from neurological psychology and ethics, such as the confidentiality of an individual's fMRI or lie detector tests, as these types of information could potentially be used against the individual or indirectly influence their lives without their full awareness that this is occurring.**

Relevance of the study over time

Q: This study was done in 2011. Are fMRI's still used to study branding efficacy?

PoloBravo: Yes, fMRIs are still used to study branding efficacy. An example of this was in a recent study related to "brand betrayal" that was performed in 2018. It investigates the processes occuring in the brain that cause people to have a strong connection to a brand and buying a product from a competing brand can actually cause the brain to act as if this is an immoral act (Reimann). The students were asked about a past experience related to a feeling of brand betrayal and they were asked about the emotions attached to that memory. The fMRI results showed a very strong activation of the dorsolateral prefrontal cortex in students that felt that they had betrayed a brand that they had a connection to. This region of the brain is known for its function in decision making and therefore could be related to the decision to

choose the competing brand.

Q: This was published in 2011, are there any applications of this study being used today?

DivideSegment: I was not able to find any sources that were very recent, however a 2015 article re emphasised the implications of neuroimaging for markets and how it can be used in a business setting. There are neuromarketing services that offer fMRI scanning and companies who embrace this will have a competitive advantage (although again this was 2015).

Q: Have there been more recent studies on using neuroscience to predict popularity of music? If not, then on popularity in other areas?

WelcomeSoda: This article focuses on what makes popular music have a different neurological response than artistic music.

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