

A BOTTOM-UP DISCURSIVE APPROACH TO GENETICALLY MODIFIED ORGANISMS

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ABSTRACT

The debate on genetically modified foods has been characterized by a heteroglossia of voices, ranging from experts, authorities, to scholars, community organizations, media, or consumers. Within such a context where there have been observed various food safety scares over the past decades or some public ignorance regarding the use of biotechnology related to food issues, the Debating Europe platform launched debates on arguments for and against GMOs. Thus citizens turn into prosumers of content regarding food safety and (de)legitimizers of EU policies and/or other social institutions. In our study of the comments posted by e-citizens on four debates on GM foods launched on the Debating Europe platform, we will use framing theory (Goffman, 1974; Entman, 1993; Wynne, 2001; Cook et al., 2004) and the Integrated Crisis Mapping Model (Jin et al., 2012) for negative emotions and Plutchik's wheel of emotions (2001) for positive emotions to determine the salience of (de)legitimizing frames employed by the supporters and opponents of GM foods, and to examine the role of affective stance in the evaluation of the social actors related to GMOs. Using QDA miner and WordStat, computer assisted qualitative data analysis softwares, we will conduct a content, cluster and correspondence analysis of the (de)legitimizing frames and emotion valences. Whereas the content analysis provides an insight into the frequency of frames used by e-debaters and into the key lexical items that express evaluation and affective stance related to GM foods, the explorative analyses reveal the types of (sub)clusters which prevail in the e-debaters' comments on GM foods. The findings of this study suggest that e-citizens mainly perceive the issue of GMO through a political frame associated with anger and a health frame associated with fright.

Keywords: Frame, Affective Valence, Debating Europe.

INTRODUCTION

'Feed the world', 'stronger crops = less pesticides', 'enhanced health' are three arguments in favour of genetically modified organisms that are counterbalanced with 'environmental risk', 'big business eats small farmers' or 'nothing tastes better than nature'. Despite this seemingly balanced debate between GMO supporters and opponents, the findings of the Eurobarometer 341 (73.1/2010) showed that European

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are rather ignorant about GMOs and mainly have a negative attitude towards this type of food. Although 84% of Europeans have heard of genetically modified foods, only 38% searched for information about GMOs. 59% of Europeans believe that GM food is not safe for their health and that of their family and an even larger majority (70%) say that GM food is "fundamentally unnatural". More than half of the Europeans consider that GMOs harm the environment (53%), that they are not good for the national economy (50%) and that the development of GM food should not be encouraged (61%). Europeans (43%) are also not very confident that GM foods may help people in the developing countries.

Two years after the results of this Eurobarometer were made public, the Debating Europe platform launched two debates about the possibility of banning GMOs and about the reasons whether the EU needs this type of food. Four years later the debate was relaunched, but this time the focus was on the Europeans' scares regarding GM foods and on adopting the US trade deal for European products. The scope of this study is to examine the exchange of comments on GMOs generated within the four debates on the Debating Europe platform, especially in terms of the frames used by MEPs, experts and e-citizens and of the affective valences commonly expressed when an issue stirs conflicting opinions.

Brief Insights into Studies on GMOs

The literature on GMOs (Wynne, 2001; Papastefanou et al., 2003; Cook et al., 2004; Valletta, 2010; Heiman & Zilberman, 2011; Cinici, 2016) has mainly highlighted various polarizations regarding the type of agency (expert versus non-expert communication), the type of information (risk versus benefit information), attitudes (positive versus negative), the formation of rejective or accepting attitudes (individualisation versus collectivism, high versus low level of knowledge) or frames (ethical versus technological).

In his study on consumer perception of GMO, Marco Valletta (2010) mentions the findings of previous studies which revealed that consumers value risk information more than benefit information, that balanced information has a much higher impact on risk perception. Valletta considers that the salience of "negative perceptions and attitudes to GM foods is based on a perceived risk which (...) can be very far from a rational, science based assessment of the risk. (...) Sometimes GM foods are perceived (...) as unnatural and therefore risky, without necessarily a rationally defined idea of 'unnatural' and even less so of the link between unnatural and risky."

Other types of studies deal with the discourse of GM scientists because as Cook et al. (2004) highlight, "among the many players in the debate", GM experts "do have a privileged and influential contribution to make" (p.435). The findings of Wynne's study and of Cook et al.'s qualitative study reveal that in GM scientists' opinion, media created and aggravated the 'food scares' issue and the opposing public is "intellectually vacuous" (Wynne, 2001, p. 447) and uniformly ignorant of GM science and has no understanding of risk. Whereas non-experts lay an emphasis on safety associated with who benefits from and who controls the technology, scientists mainly focus on the frame of empirical objectivity.

Cinici's study (2016) started from the rationale that the risk perception and negative attitudes towards GMOs may be associated with the fact that individuals only have access to the final product of the scientific process (p. 1847). His research shows that when individuals are familiarized with the process of scientific knowledge building,

they perceive the issue of GMOs not only as value-laden and moral problems, but they also tend to switch to rational interpretation of scientific information (p. 1862).

One important common finding in the studies of Cook et al. (2004) and Cinici (2016) is the role that education plays in (de)legitimizing genetically modified organisms. Whereas the GM specialists interviewed by Cook et al. claimed that through education, the public ignorance of science may be “remedied” (p. 439), the experimental study run by Cinici shows that “the more

understanding about the nature of scientific knowledge and scientific enterprise students have, the more they develop scientifically balanced risk perception about controversial scientific issues.” (p. 1862)

Theoretical framework

Since online debaters, MEPs and experts were asked about the use of GMOs in the EU, we consider that citizens become providers of arguments for (not) banning genetically modified foods. Thus, this study will focus on the frames and the emotional attitudes that e-debaters have about the issue of genetically modified organisms. Frames are used to make sense of information or an occurrence (Goffman, 1974, p. 21), providing “principles for the organization of social reality” (Hertog & McLeod, 2001, p. 140). Frames rely on the selection of “some aspects of a perceived reality” which are made “more salient in a communicating text, in such a way as to promote a particular problem definition, causal interpretation, moral evaluation, and/or treatment recommendation for the item described” (emphasis by R.M. Entman, 1993, p. 52). In the literature (Wynne, 2001; Cook et al., 2004), six frames are associated with GMOs: moral (Is it justifiable?), economic (What does it cost?), social (Who benefits?), political (Who controls it?), aesthetical (Does it make food more pleasing to the senses?) and scientific (Is it safe?).

Besides the referential information, e-citizens also provide non-referential information, such as emotions. Since an affective stance is a “socially recognized feeling, attitude, mood of degree of emotional intensity” (Ochs, 1990, p.2), we consider that the analysis of affective stance is significant within the context of an issue which has raised many conflicting opinions. In our study, we will adopt Plutchik’s wheel of emotions (2001) for positive valences and the Integrated Crisis Mapping model (Jin et al., 2012) for negative valences. Both these types of valences are developed in section 4.

Methods

We employ a content, cluster and correspondence analysis of four debates on genetically modified organisms, launched on the Debating Europe platform: Should Europe ban genetically modified foods? (started - 24/05/2012); Does Europe need genetically modified foods? (started 22/06/2012); Why are Europeans scared of GMOs? (started 10/02/2016); Will European product standards fall with a US trade deal? (Started 29/08/2016). Our sample included 186 comments, out of which six comments were posted by MEPs (Liberal Democrat, Social Democrat, Group of Greens), by the EU Commissioner for Health and Food, and by a molecular biologist.

We imported the experts’, MEPs’ and citizens’ comments into QDA miner, a qualitative data analysis tool optimized for coding, annotating, and analyzing textual information. The QDA miner codes, under the form of frames and types of affective

valences, facilitated a coding frequency and a cluster analysis of coding co-occurrences. Using Wordstat 7.0.13, a computer-program-assisted text analysis based on a text mining program, a correspondence analysis was employed to identify the relationship between keywords and the frames and affective valences used by debaters for the issue of genetically modified organisms.

The study employs both a deductive and an inductive method. The comments were examined for frames specific to the GMO issue that emerged inductively within and across the 186 texts. We created a categorization scheme within QDA miner, which included six frames: health, political, ethical, socio-economic, scientific, and religious. Whereas the health frame refers to textual accounts about health risks and benefits, the political frame includes references to public and private bodies which may control the investment into GMOs, or to policies that may favour the GMO production. The ethical frame focuses on issues related to environmentalism and to social responsibility. The socio-economic frame includes accounts to the social gains and losses and to the financial costs associated with GMOs. While the scientific frame embeds those utterances, which focus on scientific reasons for explaining the GMO production, the religious frame refers to textual accounts about beliefs regarding the act of creation.

Affective stance revealing various levels of emotional involvement was coded as positive (acceptance, trust, and joy) or negative (anger, sadness, anxiety, fright). For the positive valence, we used Plutchik's wheel of emotions and we selected: acceptance (e-debater's assent to GMO), trust (e-debater's willingness to rely on the actions of another party) and joy (e-debater's satisfaction about a certain situation). For the negative valence, we adapted four negative emotions from the ICM/Integrated Crisis Mapping model (Jin et al., 2012): anger (e-debater's indignation towards some situation which may have a direct effect on his/her well-being), sadness (e-debater's feeling of distress about a certain situation which may cause irreversible damage), anxiety (e-debater's feeling of worry), fright (e-debater's dread towards a situation which may be perceived as life-threatening).

A content analysis of a sample of online texts ($n = 30$), approximately 15% of the total number (186) was double-coded to determine inter-coder reliability. The Krippendorff reliability coefficients ranged from .87 for frames, and .83 for affective valences (Hayes & Krippendorff, 2007).

The research questions that we want to address are the following

RQ1: Which frames are used by e-citizens and MEPs regarding the issue of GMOs?

RQ2: What key lexical items correspond to the frames associated with GMOs?

RQ3: How do frames and affective valences cluster together?

Findings

Figure 1 shows what types of frames online participants used regarding the issue of genetically modified organisms (RQ1). As observed, all six frames were mentioned in their comments, but the most salient ones were the political and health frames, followed by the scientific one. A much smaller usage can be noticed for the socio-economic, ethical, and religious frames.

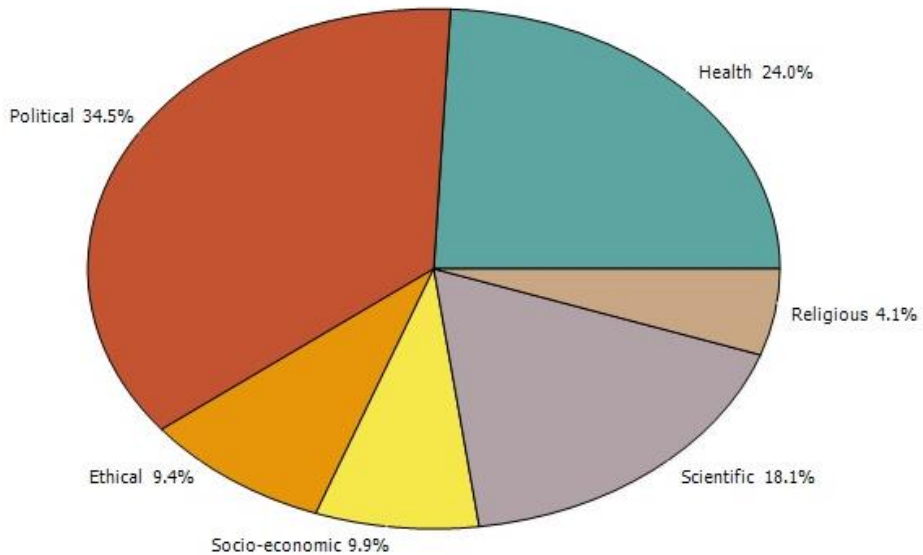


Figure 1: The Issue of GMO – Salience of Frames

Since the correspondence analysis is a perceptual mapping using the proximity among each category of variables (Whitlark and Smith, 2001), we wanted to explore how e-debaters express the relationship between lexical items and the framing of genetically modified organism issue (Figure 2).

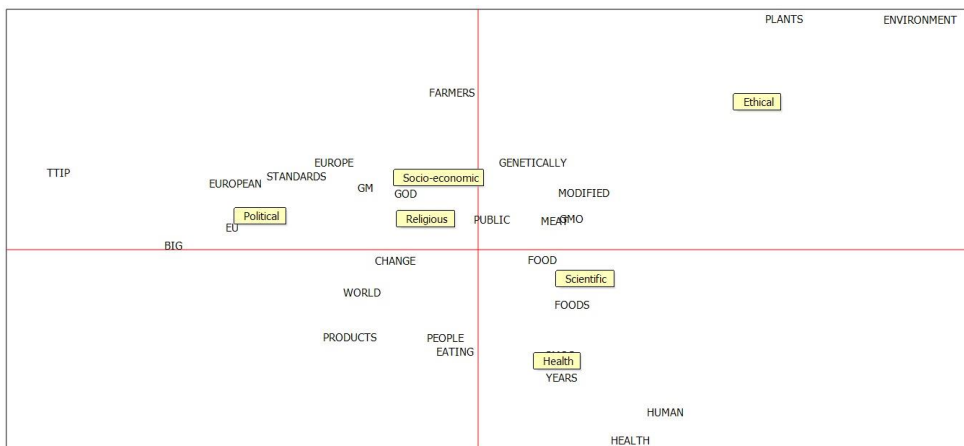


Figure 2: Correspondence analysis

The horizontal dimension is characterized by the adjective “big” and the verb “change” on the left and by the noun “food”. The “health” frame is closely located with the following lexical items – “years”, “people”, “eating”, “human”, “years” or “products” – which can be interpreted as e-debaters’ concern about the types of

products that people eat and that might affect their health. The “political” frame is clustering with “EU” “big”, “standards” or “TTIP”, which describe the organisations and the agreements which are blamed for taking advantage of the GMO production, namely: big (corporations) and the Transatlantic Trade and Investment Partnership. “Scientific” is closely related to “food” and “foods”, which suggests the e-debaters’ plea for experts’ studies on the food that we eat. Whereas the “socio-economic” frame is clustering with “farmers”, implicitly referring to the losses that GMOs may bring to them, the “religious” frame is closely located with the noun “God”, thus emphasizing the issue of creation which may be associated with the production of genetically modified organisms. The “ethical” frame is related to “plants” and “environment”, which describe the potential positive or negative consequences of GMOs upon the climate.

The third research question investigated the way in which frames and affective valences cluster together in e-participants’ comments. Through a cluster analysis, we wanted to determine the patterns among the codes (frames & valences) in terms of their co-occurrences. The conditions for the dendrogram (Figure 3) were the following: for clustering – occurrence (Within case), index (Jaccard's coefficient); for multidimensional scaling options – tolerance – 0,000001, maximum iterations – 500.

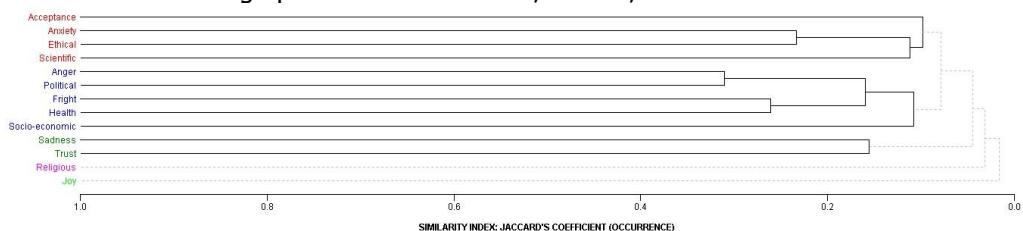


Figure 3: Dendrogram – Frames & affective valences

Since co-occurrence of codes implies a semantic similarity, we will label the clusters of codes (frames and affective valences) as larger themes or topics which can be revealed from the internal organization of the debate on the genetically modified organisms. As observed, there were formed two clusters from the Jaccard similarity index, that we have grouped in two main topics:

- Loss topic: (political-anger, health-fright) – socio-economic
- Reluctance topic: ((ethical-anxiety)-scientific) - acceptance

Discussion

The GMO issue examined in this study provided a twofold insight: on the one hand, the experts’ and MEPs’ insights presented as incipits of the debates launched on the Debating Europe platform, and on the other hand, the e-citizens’ assessments of genetically modified organisms. The findings of the study revealed a clear polarization in the bottom-up approach: loss versus reluctance.

The loss topic is characterized by e-citizens’ struggle to delegitimize the organizations which may benefit from investments into GMO production and to legitimate the risks that GMOs may have upon one’s health. While anger was the dominant affective valence displayed by e-debaters when shifting the blame onto those political bodies behind GMOs, fright was the salient emotion associated with the

life-threatening consequences of GMOs. Word selection plays an important role in the blame shifting within the political and health frames.

The words associated with the political frame are expressed through:

- nouns depicting the magnitude of the financial benefits (“In the mean time billions € profit will be made”, Guy WEETS, August 5th, 2013; “(...) the private sector is thinking about profits more than security”, S.K, February 13th, 2016). The Dutch MEP with the Green Left Party, Bas Eickhout, provides a negative presentation of GMO production, making a plea for decentralization: “But what’s far more worrying is that it’s giving a monopoly position to the food industry as it takes over the whole market. If there’s one thing that should be decentralised, here and in the developing world, it is food production. Instead, we are talking about seven companies who own the majority of GM crops.” (May 24th, 2012).

- proper nouns evoking companies (Dow Chemical), persons (Bill Gates) or political agreements (TTIP) considered responsible for GM products (“Genetically modified food is only a problem because behind them are Dow Chemical and other big corporations that could tied up farmers to them”, Vicente Silva Tavares, May 24th, 2012; “And are you aware that Bill Gates is heavily invested in these GM products?”, Catherine Benning, November 7th, 2012; “Powers by corporations to enforce GMO & (legal) powers over governments as a (hidden) package under TTIP is unethical politics (...)”, EU reform- proactive, February 11th, 2016; “TTIP is the symbol of Europe’s corruption and the power of the oligarchs over all.”, Bódis Kata, August 30th, 2016).

As the correspondence analysis (Fig.2) showed, the acronym TTIP was closely used with the political frame. The association between TTIP and this frame is actually induced by the last debate under analysis, where e-debaters were asked whether European product standards should fall with a US trade deal. The high number of comments (n = 55) also determined the underscoring of the health frame (see Figure 1).

The wording through metaphors and emotionally-loaded adjectives is suggestive in the depiction of the health frame. The feeling of fright is emphasized through the mental images of monsters (“(...)... we eat GM food we’ll become GM humans... aka monsters... nein Monsanto danke!”, Simona, August 31st, 2012; “(...)We creat monsters with GMO”, CESARO, June 22nd, 2012), or of deformed children (“(...) Thats one of the reasons for increasing number of deformed children.”, Karl Haro von Mogel, June 22nd, 2012). The potential disastrous risks upon one’s health are rendered through the metaphor of a bomb: “GMO is a time bomb in the body that causes serious diseases and uvreyda human body...!!!” (Vencislav Milushev, August 5th, 2013). Schemes of comparisons are used by e-participants to (de)emphasize the health frame. Whereas the analogy through similarity (smoking cigarettes - GMO) is employed to transfer the dangerous effects from one product to another (Kali, May 26th, 2012), the analogy through differences (pesticides or additives - GMO) highlights the low level of danger since the former type of substances may change one’s genes and may have carcinogenic properties (Sacha Pakalin, May 30th, 2012).

Although the cluster analysis showed that the health frame mainly co-occurs with fright, there were comments in which risks are not so much emphasized, the e-participants express a neutral position regarding genetically modified organisms using a personal authorial voice. For example, Shane from Australia presents his experience as a consumer who has been using GMO for 10 years. He considers that GMOs are the

only solution because of the natural conditions ("no rainfall") and he mentions that he has had no health problems so far (September 1st, 2014).

'Food availability' is a syntagm which prevails within the socio-economic frame and it is clearly invoked as a social gain by the Dutch social democrat MEP, Judith Merkies: "(...) the real problem was not so much one of patents, rather the problem of feeding the rapidly growing population of Earth (predicted to eventually reach, and perhaps even exceed, nine billion people)" (June 22th, 2012). By an implicit polarization poor versus rich countries, some e-participants consider that GMOs are a solution against hunger: "Well, even mother nature itself modifies food genetically. It can be a chance for poor countries" (Kurt Koenig, June 22th, 2012); "I'm ok to take the risk of eating GMO if this means that everybody will have food" (Eric David Bosne, August 5th, 2013).

The reluctance topic is characterized by a merging of delegitimizing GMOs on account of being harmful for the environment (ethical frame) and of legitimizing GMOs on account of expert-like evidence (scientific frame).

The negative wording prevails within the ethical frame both in the Green Left Party MEP and in the e-citizens' comments. It mainly focuses on emotionally loaded adjectives, adverbs and verbs expressing anxiety and depicting the potential devastating consequences for the environment: "But the important thing is that GM crops are absolutely catastrophic in the long run for the environment." (Rebecca Sereinig, May 24th, 2012); "Whether or not GM is directly bad for health, it is certainly damaging for biodiversity (...) (Bas Eickhout, a Dutch MEP with the GreenLeft Party, May 24th, 2012); "(...) it can easily take over and destroy the local, natural flora as well as fauna" (Rick Hoppmann, May 22th, 2015). Freedom of choice is evoked by e-debaters as a value closely associated with the ethical frame. Some e-participants seem to accept GMOs if they are labeled and they may choose: "(...) After that, label everything that has GMO's in it and tag the others as free of GMO's. (...) Let the farmer and the consumer have a choice." (Mattias, November 27th, 2012).

The scientific frame was the most polarized frame since e-debaters argue about the nature of the evidence brought to sustain their arguments. The clash between GMO supporters and opponents is emphasized in the verbal exchanges between Tooba or Sacha Pakalin, on the one hand, and Cathering Bening or Simona, on the other hand. Sacha Pakalin explains why there is no risk from ingesting a gene (May 30th, 2012), how DNA is metabolised once ingested in the gastrointestinal tract (September 3rd, 2012) or the difference between industrial pesticides and anti-pest proteins (November 3rd, 2012). On the other hand, Tooba considers GMOs as a good solution for the booming population of the world and he delegitimizes the GMO opponents' online evidence considering that they "(...) never use science to validate their claims (...)" and that they "(...) feel offended if someone says you are not well educated on the topic" (May 31st, 2012). Despite the verbal confrontation between GMO supporters and opponents, there is another type of accounts provided both by e-debaters and experts or MEPs, where a plea is made for "proper studies" (MEP with the Group of Greens, February 2nd, 2016) or "full studies from independent European scientists" (Christos Mouzeviris, May 24th, 2012). It is interesting to observe that the experts (a Belgian molecular biologist, Marc Van Montagu and a Hungarian MEP with the Group of Greens, with a background in biology, Benedek Jávör) used their authorial voices to emphasize some of the failures related to GMOs. Marc Van Montagu considers that despite the fact that "GMOs are a safe and reliable solution", scientists were not able

“to communicate the benefits to people” (May 24th, 2012) whereas Benedek Jávör worries about the lack of “proper studies” on “the environmental and health impact” (February 2nd, 2016) although as a biologist he is “not completely against technological development”.

Conclusion

The four debates under analysis constitute another example of ‘the heteroglossia of voices’ (Cook et al., 2004) regarding the genetically modified organisms. The insights on GM foods embedded both a top-down discourse (delivered by MEPs or experts) used as incipits of the debates and a bottom-up discourse formed of the e-citizens’ comments. Although the debates were launched two and six years after the Eurobarometer 341 (73.1.), the findings of this study show that the e-citizens’ perceptions on GMOs did not change dramatically. In 2010, 57% of European considered that some people benefit from GM foods while others are put at risk (EB 341, 73.1, p. 18). The e-debaters’ most prominent frames and affective valences focus on the political frame closely linked to anger and on the health frame closely linked to fright. Europeans and the Dutch MEP with the Green Left Party shift the blame onto a monopoly of GMOs coming from certain companies and persons. The emotional loaded description of possible negative outcomes of GM food consumption could be associated with the messages sent by the key authoritative participants in the debate, namely the MEP with the Green Left Party who has a background in biology and a molecular biologist. Whereas the former makes a plea for long-run studies on the environmental and health impacts, the latter acknowledges the experts’ miscommunication of the GMO benefits. Despite the pervasive use of negative valences within the e-citizens’ frames, the results highlight a positive thread of arguments connected with GMOs as a solution to world hunger which is actually consistent with the message promoted by Vytenis Andriukaitis, EU Commissioner for Health and Food Safety, throughout his reaction on the debate “Why are people scared of GMOs?”. This study on the debates on GMOs launched on the Debating Europe platform shows that the communication process of the benefits and risks of GM food still needs the emergence of proper authorial voices which may stop the e-citizens’ skeptical and/or ambivalent attitude towards genetically modified organisms.

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