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A Multimedia Q Methodology Investigation of the Degrowth Concept Among Young French Citizens

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Abstract: The acceleration of research efforts dedicated to degrowth has been noticeable since 2012, along with a growing public interest. While there are many definitions of the degrowth notion, Schneider et al. (2010) define it as "an equitable downscaling of production and consumption." Many views and discourses on degrowth exist but we can wonder to what extent people perceive different aspects of degrowth and its implications. These views and representations of the concept can be sketched by verbal, visual or even auditory stimuli. For that reason, we describe a two-part multimedia Q-methodological investigation of degrowth based on statements, pictures and sounds. In the first part, young French citizens trained in sustainable development project management completed three Q sorts with separate Q samples, each comprised of statements, pictures or sounds. In the second part, a different set of participants completed a follow-up study with just a picture Q sample. Eight subjective views of degrowth were identified: institutional, idealistic, back to nature and pacifist, consumption-aware, activist, analytical realistic, socio-degrowth, and holistic. Two of them were captured only though non-verbal stimuli.

Keywords: Climate change, degrowth, multimedia, subjectivity, sustainability

Introduction

Environmental issues are a hot topic as reflected in the sixth assessment report of the International Panel on Climate Change (IPCC, 2023). This points to alarming indicators pertaining to climate change. Moreover, in their editorial in the journal *Science*, Voosen et al. (2018) state that the gap between those concerns and the actions taken to solve these environmental problems is a major issue. Amid tangible climate change, natural resources exhaustion, deleterious mass-consumerism, and globalization, the degrowth discourse, once regarded as utopian, is gaining attention and legitimacy among the general public - a tendency reinforced by the pandemic crisis of 2020. In simple terms,

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degrowth is a political, economic and social concept that challenges the idea that increased wealth and economic growth lead to increased social well-being and sustainable development. The following paragraphs present three research traditions central to understanding the modern degrowth concept.

The notion of degrowth first appeared in France with the term *décroissance*. The degrowth *à la française* (Gorz, 1991; Illich, 1973; Latouche, 2006; Martinez-Alier et al., 2010) originated in the work of Ellul and Charbonneau in the mid-1930s (Charbonneau and Ellul, 1935, 2014). They critically analyzed the technique and the development of cities, challenging the central underpinnings of societal notions of quality of life and solidarity. The French school of thought is a current of thinking that is critical of the development of material production and questions its compatibility with the survival of the system. This first research tradition is particularly attentive to the social aspects related to the notion of a "good life," with its central concepts of voluntary simplicity, economic downscaling, and consumption reduction.

The second research tradition is the ecological economic tradition which questioned environmental degradation. This tradition is associated with the work of Odum (1973), Meadows et al. (1972), Schumacher (1973) and Georgescu-Roegen (1971), who considered that industrial production systems were in competition with ecosystems. Therefore, they promoted the idea of a sustainable societal transformation preserving the intrinsic value of ecosystems (Demaria et al., 2013).

Lastly, an international degrowth research approach is now arising, building upon the two former traditions, and combining modern perspectives. Degrowth is not a uniform notion and various meanings are available (Martinez-Alier et al., 2010). The construction of the word itself can also bear various meanings. According to Farrow, Grolleau and Mzoughi (2018), the prefix *de-* can lead to a negative perception of the word, especially as it is associated with *growth* which has a positive connotation. This perspective echoes Drews and Antal's (2016) semantic analysis that underlined the controversial nature of the term "degrowth," calling it a "missile word" due to its negative connotation. Because of its nature, the concept of degrowth is not easily appropriated by mainstream political and economic discourses. Drews and Antal (2016) advocated for a clear definition to inform people about the practical implementation of degrowth. Schneider et al. (2010) defined it as "An equitable downscaling of production and consumption that increases human well-being and enhances ecological conditions at the local and global level, in the short and long term" (p. 511).

Given this genealogy, the concept of degrowth covers both positive and negative aspects. Beyond the academic field, it is essential to understand citizens' viewpoints, particularly those of young citizens, whose viewpoints remain largely unexplored. This study aims to offer insights on three research questions: To what extent do people perceive the different aspects of degrowth? What are the verbal, visual and auditory depictions of this concept? And, in a more speculative approach, could we relate these public views to the acceptance of degrowth?

We use Q methodology to investigate perceptions of degrowth and to better understand how young French citizens consider its potential implementation. Through a multimedia approach based on 37 statements, 45 pictures and 31 sounds, we established eight main subjective views of the degrowth concept: institutional, idealistic, back to nature and pacifist, consumption-aware, activist, analytical realistic, socio-degrowth and holistic. We believe Q methodology's original methodological principles are particularly helpful in understanding the degrowth concept in all its forms.

As the definition of degrowth is still changing, it is important to explore how the public understands this concept. The aim of this article is to understand all the thoughts and actions to which this concept can refer. Through texts, sounds, and images, we identify various viewpoints that provide an overview of the degrowth concept. This multimedia perspective allows us to capture more viewpoints than with the use of only one media. Of the eight views we found, two of them were constituted only by visual and auditory stimuli representations of degrowth.

The rest of this article is divided as follows: We first review empirical developments in the degrowth literature before we discuss the advantages of a multimedia Q study. The research design is then discussed. Study One is composed of three sub-studies using the same group of 21 young citizens trained in sustainable development projects, meaning that most of them participated in all three sub-studies. Study Two consisted of a visual retest with 15 other young participants who were not trained in sustainable development projects to enrich the available viewpoints. Following the presentation of results, we conclude by drawing a parallel between our results and the degrowth literature, consider the limitations of this research, and suggest further research perspectives on the degrowth concept.

Review of Empirical Literature Related to Degrowth

The current state of literature related to degrowth suggests that empirical studies are still underdeveloped and that there is ample room for Q methodological investigations to enrich our knowledge. While theoretical developments are flourishing, empirical investigations are far less developed in terms of number of publications. However, as shown in Appendix A, researchers have used a variety of methods to study the concept of degrowth, indicating a dynamic field. Most of this research retrospectively analyzes specific experiences through case studies. Videira et al. (2014) used qualitative interviews to document and expand knowledge related to the degrowth concept. Ančić and Domazet (2015) identified economic indicators related to degrowth acceptability through a secondary data analysis.

The results of many studies deal with degrowth implementation and practical ways to implement degrowth projects. However, Kallis and March (2015) noted the limitations of implementing those projects as the studies were based on a smaller scale (Borowy, 2013; Cattaneo and Gavaldà, 2010; Joutsenvirta, 2016; Weber et al., 2019). Large-scale experiences remain to be undertaken. Almost half of the empirical studies used secondary data. While this has the advantage of building upon large databases, a limitation derives from the non-focused character of such data and subsequent proxy approach. Those studies, however, illustrate that in Europe degrowth endorsement is still limited (Ančić and Domazet, op. cit.).

Policies that force degrowth stumble over logistical issues (Borowy, 2013), and conflict between authorities and activists make it difficult to find conciliatory pathways to social change (Joutsenvirta, 2016).

Degrowth research using primary data often employs case studies and more qualitative approaches to participants' degrowth-focused experiences (Cattaneo and Gavalda, 2010; Weber et al., 2019). These studies show the difficulties that arise in the collective construction of a diminishing lifestyle due to the existing tensions between individual behaviour and coordination mechanisms. Videira et al. (2014), based on primary data collected from academic papers, offered an interesting collection of the

most pressing issues in the degrowth research agenda. None of these primary data studies, however, directly explores the representation of degrowth by citizens.

All in all, empirical publications on degrowth remain underdeveloped, and this is also the case for Q methodological approaches. One exception is a study focusing on degrowth representations recently conducted with different stakeholders (Stevenson, 2019). Based on a Q methodological approach, this study is particularly relevant to our project and exhibited three viewpoints: radical transformationism, cooperative reformism, and state progressivism. The Stevenson (2019) study is probably the most closely aligned with our research questions; However, it included multiple stakeholders, including engaged academics and intergovernmental organization members. Our study focuses on the views of young adults.

To summarize, while empirical research efforts are engaged, there is still room for additional contributions notably as pertains to citizens' representations.

Development of a Multimedia Q-Study Approach

Given the diversity of theoretical understandings of degrowth, the expansion of its applications in real life situations and actions, and our focus on young adults, we adopted a multimedia approach to capture the sensitive underlying inter-subjective dimensions of this concept. Two main reasons guided this methodological choice: First, the early, non-textual tradition of research in Q methodology studies; Second, our focus on young adults.

Gauzente and Good (2020) remind us that Stephenson himself experimented with the use of non-verbal stimuli at the early stages of the development of Q methodology (Stephenson 1953, 2004). They noted that multimedia stimuli offer "opportunities to circumvent difficulties and obstacles stemming from written language in specific circumstances as well as extending the scope of Q methodological studies well beyond the use of just verbal material" (p. 172). This rationale is also explicit in visual studies conducted by Grosswiler (1992, 1997), in which the objective was to avoid limitations stemming from the linear nature of textual/verbal expression to embrace a thicker representation. The flexibility of Q methodology allows for the use of alternative materials, not only visual but also audio, video, or even tactile devices to capture the perceptions of individuals in a holistic manner. Zanoli et al. (2015) and Naspetti et al. (2016), also suggest that visual stimuli offer access to realistic experiences for participants and are more likely to persist in their minds.

Furthermore, young adults are particularly familiar with non-textual forms of information: Their heavy use of social media (Pew Research Center, 2021) involves mostly visual and auditory information. This observation encouraged the adoption of alternative media as investigative tools, including the use of Q methodology.

Taken together, the three different Q studies (using text, sounds, and images) implemented in the present research aim at embracing a thicker and more complete understanding of how young citizens view degrowth.

We considered two options for the use of the different materials. First, creating a single, unique multimedia Q sample combining visual, verbal or auditory items. However, the sensibility of a participant to one medium or another could influence choices. It could also be hard to interpret the results. The second option was to create three different Q samples, each composed of one type of media. The second methodological option was selected for this study. However, to preserve consistency in the results, we tried to use the same set of participants for all sorts so we could compare their views of the topic through the prism of a multimedia approach.

We expected that the results from this approach might be interesting for many reasons. Textual Q samples should facilitate the refinement of factor interpretation. Visual and auditory Q samples could help participants share non-verbal and more difficult-to-describe aspects of their subjective views, introducing a more holistic approach to the understanding of concepts. The post-sort interviews conducted after each type of Q study should also elicit complementary considerations. Thus, the coupling of the three media with the interview material provides an innovative grasp of participant experiences of degrowth.

Research Design and Data Collection

Elaboration of the Concourse and Selection of Q Samples

The first study, conducted in late 2017, involved a set of 16- to 21-year-old students, trained in sustainable development project management. Three types of media were chosen based on two criteria: (1) appeal to different senses and (2) implementation constraints. Degrowth was to be investigated with not only verbal stimuli, using a concourse of statements drawn from a literature review, websites and short interviews, but also with non-verbal stimuli employing two concourses built from a gleaning of a variety of appropriate images and sounds. To establish the concourses, a focus group for each type of media was conducted. All students in the focus groups shared their views about the degrowth concept through each type of media. Then, students were asked to work in small groups to select non-redundant and specific items to represent all ideas and to reword items that were not clear. Q samples were then drawn from the concourses with special attention to preserving nuance related to perceptions of degrowth. Descriptions of the final Q samples are provided in Appendix I.

Q-Sorting Process

A total of 21 students took part in this study during their lectures. Whenever possible, each student completed all three media sorts. Of the 21 participants, 17 participated in the auditory-based study, 16 in the image-based study, and 21 in the text-based study. There are more students in the text-based study because some students did not attend the lectures when the auditory or image studies were conducted.

For each multimedia study, participants had a paper grid in front of them in which they had to arrange cards with statements, images, or with the name and number of a sound. For the sounds, each participant was provided with headphones and a computer with a file containing sounds lasting up to 10 seconds. Each sound corresponded to a file with an item number and a short description, and it was possible to listen to a sound as many times as the participant wished.

Before beginning each study, participants were asked to view all the items from the respective media Q samples and classify them into three piles (representing degrowth well, neutral or not well representing degrowth). Once this initial classification for one media had been made, a more detailed item-by-item classification was carried out, with one item per grid cell. Participants were given the opportunity to reorder the items as desired. Post-sort interviews were conducted in which participants were asked to explain their choice of item positioning, paying particular attention paid to the extremes of the grid.

Data Analysis for all the Different Media Sub-studies

We conducted factor analysis for each media study and interpreted each Q study at this level. This yielded a different number of factors and interpretations per sub-study. Factor

analysis was conducted using principal component analysis and varimax rotation, a method of orthogonal rotation which maximizes similarities within a factor and maximizes differences between different factors. Principal component analysis was chosen. After examining the factors and the correlations between them to see their independency, we based our factor choice on the interpretability of each factor, where all factors had to be different enough from the others to be interpretable. Naturally, we tried for each sub-study to add or supress a factor to see if it allowed for a better comprehension of viewpoints. On the completion of this process, we ended up with a total of 15 different viewpoints across the three studies as shown in Table 1.

Table 1

Q Sub-studies' Main Characteristics

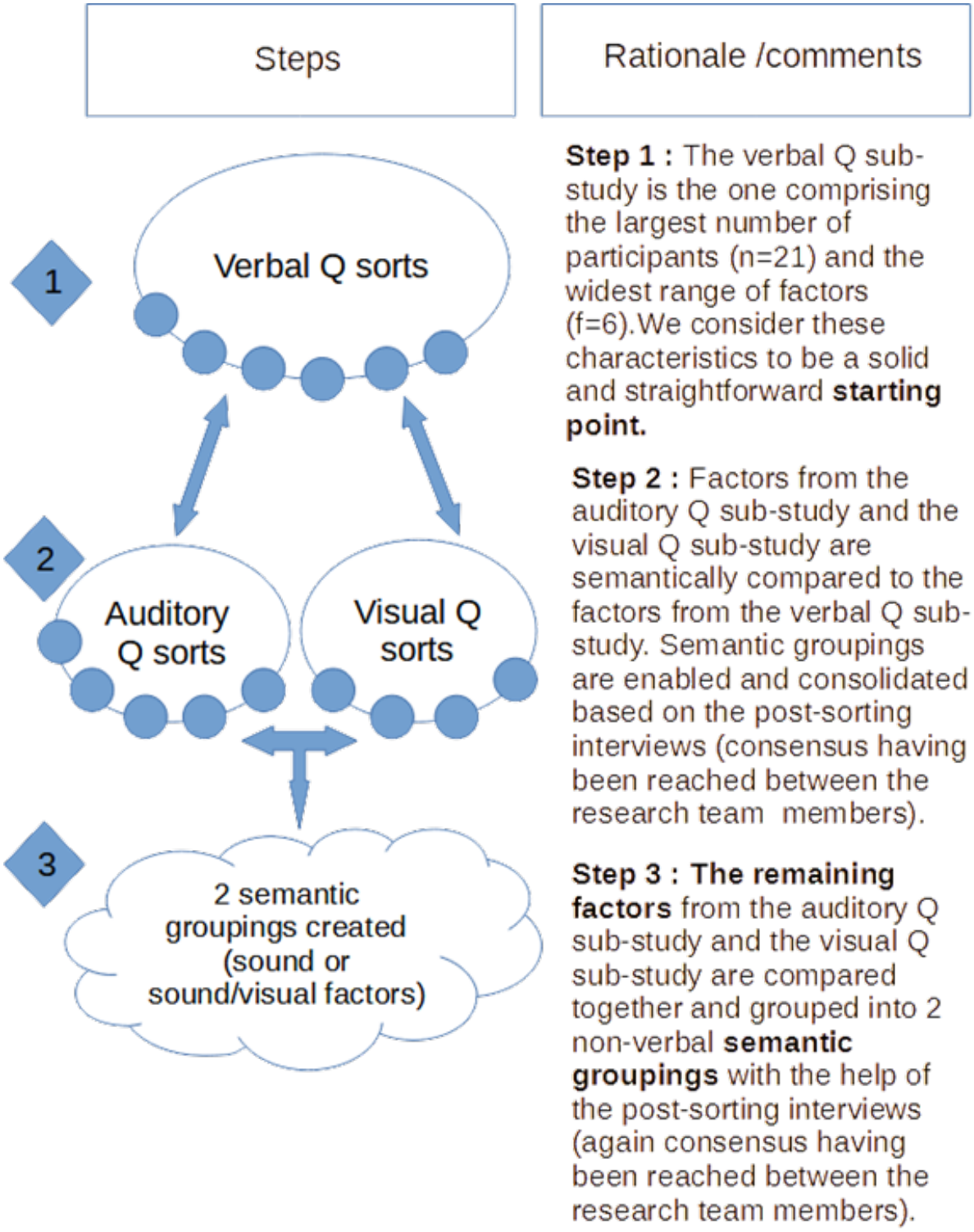
	Sub-study 1 Text-based	**Sub-study 2 (& visual re-test) Image-based**	**Sub-study 3 Sound-based**
Concourse	100	120	35
Q Sample	37	45	31
Participants	21	16	17
Factors	6	4	5
Sex Distribution	8 females 13 males	6 females 10 males	7 females 10 males
Average Age	24 years (min: 21 / max: 28)		

Construction of a Higher Order Interpretation Using all Media Sub-studies

Generally, Q studies use only one media approach (e.g., Grosswiller, 1992 or Naspetti et al., 2016 with image based Q set) but as shown by Stephenson (1953) various media can be used to better understand subjective views of individuals on a topic. To provide a broader understanding of individual perceptions of degrowth, we decided to use various media, appealing to different senses, such as sight and hearing. Even if it would have been interesting to do so, we did not have the same sample of participants in each sub-study. So, it was not possible to conduct an exact comparison by participants of different media sorts. However, we found that some viewpoints were associated with specific media and this combination of media provides more information and variability on a given topic. Thus, a higher order interpretation was conducted to identify convergences and singularities among the factors identified in the three media studies. Figure 1 details the process we conducted to elaborate these consolidated views. Based on the criteria of more participants, more factors and more detailed items, we started with the text-based study that constituted the basis of the views. Then we associated the auditory and image factors to the text-based ones in case there were similar visions between them. Compared with the six initial text-based views, the addition of the two other media offered two additional views on the topic of degrowth. These complementary media studies highlight the fact that one stimulus is able to capture new visions about a topic than the standard verbal stimuli.

Figure 1

Aggregated Views Research Process



This yielded eight aggregated views.

A Consolidating Q Study

The second Q study, conducted in mid-2018, aimed to consolidate the initial results with non-specialists. Ten participants (six women and four men, ages 21 – 30) were involved, drawn from the general public. It was implemented during a university scientific event directed at the public. Considering the practical setting, we used only the visual Q set as its handling was more accessible and easy for participants (as suggested in similar visual studies, Trudel et al., 2017).

Results

Study One - A Multimedia Inquiry (21 Participants and 54 Sorts)

We briefly describe the results of each sub-study before presenting an aggregated analysis focused on convergences (see Appendices E, F and G).

Sub-study 1: Textual Subjectivity

The text-based study revealed six factors. The first factor underlined voluntarism and sobriety toward a society with more initiative and progress (items 19 and 30 respectively with factor scores of +2 and +3)[1]. Hence, degrowth was not only a trend for hippies or bobos[2] but also involved active citizenship implementing many actions to decrease environmental impacts (items 34 and 35: -3, -2). For the second factor, degrowth appeared as a last resort among other solutions. Without optimism nor hope (items 32 and 28: -3), it faced the reality of the discontent of society and the dual economic and ecological crisis (37 and 22: +3). For Factor 3, the most essential aspect was the social one, and degrowth should answer the population's discontent and alert them through a sustainable progressive system (items 19 and 24: +3). Factor 4 showed the predominance of the redesign of consumption and production to promote a targeted consumption (items 12 and 36: +2) and preserve renewable resources (item 23: +3), without compromising employment. It even entailed the right of laziness. In contrast with Factor 4, the fifth pointed out the major role of government and politics in prosperity without growth (item 11: +3 and 1: +2). Degrowth was therefore not a trend for hippies and bobos but a long-term political implementation (items 34 and 35: -3 and 8: +3). Finally, the last factor offered a more holistic vision of degrowth with an overview on prosperity without growth, and a necessity for developed countries to adopt this system as it was not too late (items 7 and 11: +3), without giving up consumption and technology (item 12: -3).

Sub-study 2: Visual Subjectivity

Four factors emerged. Factor 1 highlighted that degrowth was everybody's concern and responsibility as it had a model-valuing nature (items 39, 44 and 5: +3) and rising against consumerism madness (items 6, 9 and 13: -3). The second factor underlined that it was above all a political and institutional revolution (items 31 and 26: +3). While capitalism was associated with consumption, degrowth is associated with communism and the end of the monetary system (items 27, 9 and 38: -3). The third factor defined degrowth as the most required ecological U-turn, being well aware of environmental issues and

[1] Hereafter, item scores are represented as follows: (items 19 and 30: +2, +3)

[2] A hippie is an adherent of a morality based on non-violence and hostility to industrial society, and a way of life that advocates freedom in all areas, as well as community life. A bobo is generally defined as an urban and well-educated person with progressive social views and environmental concerns.

promoting a return to a simpler life (items 5, 11 and 20: +3). Factor 4 was the most radical one: degrowth as a personal approach oriented toward spirituality and ecology (items 1, 35 and 10: +3), a total commitment to a new way of life.

Sub-study 3: Auditory Subjectivity

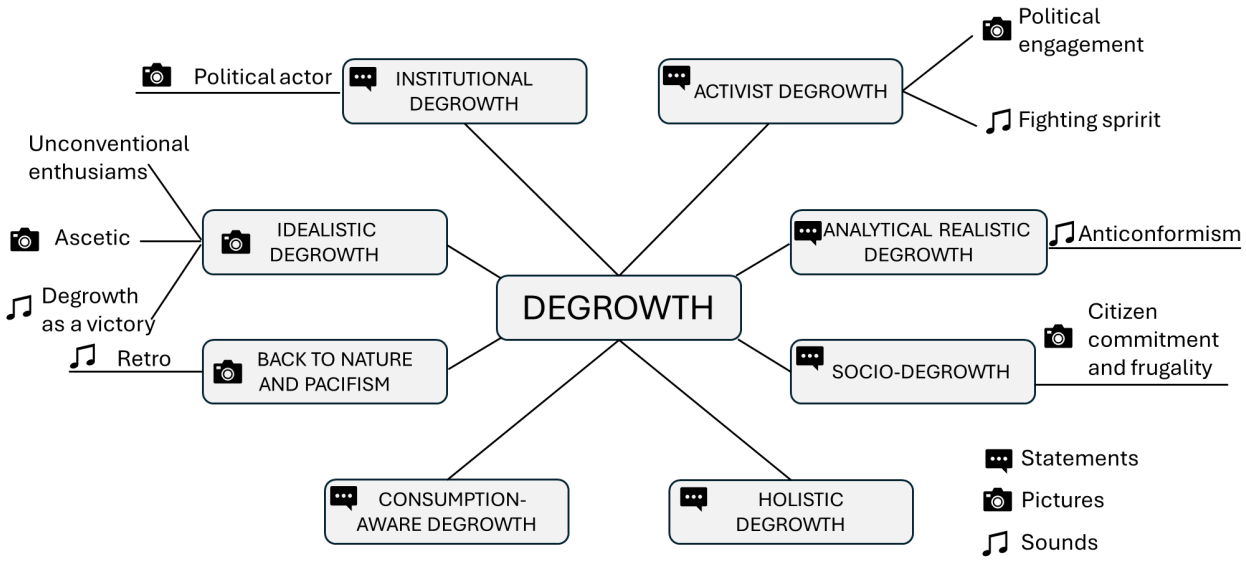
Five factors were apparent. The first factor corresponded to a pacifist belief in degrowth as a peaceful return to nature, where mankind finally belongs to the ecosystem, using clean and frugal technologies (items 21 and 20 representing birds sounds: +3 and +2). It viewed the world today as too individualistic and violent. In the second factor, degrowth was assimilated to a simple, happy and authentic lifestyle (items 30 and 10: +3). It did not, however, advocate for a return to a primal society, but rather a slowdown compared with the rhythm of current society (item 9: -3, and items 25 and 18: -2). Factor 3 considered that our lifestyle threatened our existence (items 17 and 11 linked with life and medical options: +3) and that it was possible to build a new society using frugal technologies. The most significant criticism regarding the current state of our world, was the one made against elitism and the prevalence of appearances. The fourth factor reflected degrowth's fighting spirit (item 2: +3); it was a serious matter, and the victory (item 24: +2 representing the symbolic animal of France) will be beautiful but will not come without struggle. The last factor considered that degrowth is associated with an old-school way of life going back before the digital technology development period (items 3 and 28: +3). However, it did not highlight this change as a tragic event but more as a return to old societal values (item 27: -2).

Aggregated Analysis

To conduct this aggregated analysis, we implemented an iterative, one-by-one comparison between the 15 views, reflected through the three different media. The first iteration was based on a comparison between statements and images, as they depended on the largest Q samples. Then the Q factors identified on the auditory Q sample were incorporated into the analysis. The objective of this progressive iterative process was to assert that the aggregated views would capture all the nuances contained in the viewpoints from all three media sub-studies. Figure 2 summarizes the different aggregated views and how they relate to each sub-study.

Figure 2

Mind Map of the Different Views



Aggregated View 1: Institutional Degrowth

(Encompasses textual and visual subjectivity.) This view holds that degrowth requires institutional engagement and that institutions are accountable. Although institutional responsibility is acknowledged, this does not leave citizens' responsibility aside. They clearly have some power and the possibility to influence political decisions. They should be active in this area.

Aggregated View 2: Idealistic Degrowth

(Encompasses visual and auditory subjectivity.) This view is more individually focused and considers that individuals can adopt different behaviour, inspired by more spiritual values or more dynamic and enthusiastic commitment. The relationship to institutions is not at the heart of degrowth conceptualisation. Aspiration-oriented dimensions are at work (enthusiasm, victory and exaltation, spirituality and asceticism).

Aggregated View 3: Back to Nature and Pacifist Degrowth

(Encompasses visual and auditory subjectivity.) A specific aspiration toward nature and simplicity characterises this view. The peaceful natural environment is seen as a symbol of harmonious degrowth where mankind can (re-)take its place smoothly.

Aggregated View 4: Consumption-aware Degrowth

(Encompasses textual subjectivity alone.) This view focuses on the consumption dimension and the available means that individuals can leverage. Being critical and conscious of the traps of mass consumption helps in refining more environmental-friendly and degrowth behaviours. View 4 sheds lights on consumption issues as well as on production with the need for more virtuous and purposeful processes.

Aggregated View 5: Activist Degrowth

(Encompasses textual, visual and auditory subjectivity.) This view promotes an active individual engagement in political, societal and civic actions. It overlaps with the first view to a certain extent but appears to be more combative.

Aggregated View 6: Analytical Realistic Degrowth
(Encompasses textual and auditory subjectivity.) This view adopts a more distanced, analytical, almost ironic facet of degrowth where it is not necessarily an aspiration but rather an obligation or logical consequence of past behaviours (both at the individual and collective levels). Degrowth does not appear to be a choice but an absolute necessity for mankind to survive on this planet.

Aggregated View 7: Socio-degrowth
(Encompasses textual and visual subjectivity.) This view has a specific focus on social dimensions and stresses the relevance of equality, well-being and sharing. To achieve these goals, citizen commitment to others is needed and frugality is a mean to share more equitably.

Aggregated View 8: Holistic Degrowth
(Encompasses textual subjectivity alone.) This view promotes a holistic approach to degrowth, where equilibrium between countries is considered with regard to sustainability, environmental aspects and aspiration-based values. All in all, this view is probably one of the most balanced of the eight viewpoints.

Study Two - A Visual Re-test (10 Participants and 10 Sorts)
During the University Scientific Days[3], we conducted an additional visual Q study with 15 participants. For coherence purpose, we decided to keep only the youngest participants to compare with previous studies. This is why we have only included data from 10 individuals from the same age group, though with a different background, to complete our study on sustainable development students. Results yielded three main viewpoints (factors) chosen principally on the basis of their interpretability, supported by eigenvalues (1.09) and percentage of cumulative explained variance (71%). The loading structure of our analysis (see Appendix H) exhibited three factors with one bipolar factor (Factor 3).

The first factor considered degrowth as a transformation of the way of life, rejecting money and promoting eco-friendly housing. Behavioural changes are close to "the consumption awareness and recycling behaviour" factor identified in Study One (i.e., Aggregated View 4). Elements such as the recycling logo and the image against an advertisement in mailboxes recall the same rejection. Intensive agriculture, mass consumption and the modern city are rejected in favour of more responsible and sustainable consumption.

The second factor offered a totally different vision of degrowth, which we qualify as *holistic* and which encompassed not only economic aspects but also other dimensions. It echoes Aggregated View 8 of Study One. Degrowth is not often seen as a source of sustainable development (negative appreciation of images representing the man collecting wastes, recycling and anti-advertising logos). Moreover, societal pressures toward benevolent actions and youth engagement would not lead to degrowth. Here, degrowth stands as a multi-dimensional notion. For example, it can be pictorial (with a curve), societal (communism), economical (no-money sign) or cultural (baby with tattooed ads). In other words, one participant emphasised that (non-economic) degrowth represented the end of our civilization and an actual world riddled by pollution and destruction. This factor experienced degrowth as the weakening of our living conditions.

[3] A large public event to present scientific innovations to the general audience.

The third factor echoed the "citizenship commitment and frugality" view appearing in the "socio-degrowth" factor of Study One (Aggregated View 7). It highlighted the crucial role of individual behaviours like recycling in order to promote degrowth. The peculiarity of this factor was that it was against mass consumption without questioning the advances of modernity: there was no contradiction between degrowth and progress. This factor was a bipolar one constituted by only two participants with opposite views. As we could clearly identify their perceptions, we decided not to split it.

Conclusion

In this article we have investigated the specificities of the views on degrowth of young citizens' view of degrowth and discussed our findings in relation to the extant academic literature. Our literature review emphasized three current topics: well-being, democracy, and ecology, all pertaining to a majority of academic visions. Based on our multimedia Q study of citizens' viewpoints, we are able to highlight additional nuances of degrowth that exhibit activism and individual commitment.

Eight perceptual viewpoints were identified: institutional degrowth, idealistic degrowth, back to nature and pacifist degrowth, consumption-aware degrowth, activist degrowth, analytical realistic degrowth, socio-degrowth and holistic degrowth. Many of them included some hot topics. A top-down approach is rarely associated with degrowth in this study, in contrast to other research. It probably comes from the fact that we focus on citizen's viewpoints, that reflect real life actions associated with degrowth they could implement in their everyday life.

The methodological contribution of this paper lies in the multi-dimensional bringing together of participants' subjectivity about degrowth, thanks to the use of different media (text, image, sounds). The diversity of perceptions can be observed in the identification of a numerous factors. Some are common to several media and others are characteristic of a particular one. It is a demonstration that the multiplication of media enhances the nuances of the subjectivities at work.

As in any other empirical investigation a certain number of limitations can be pointed to, including the specificity of our sample, its size, and the focus on perceptions rather than acceptance and behaviours. Our sample was based on young citizens which certainly constituted an interesting population but would need to be extended to a larger portion of the population. The perception of degrowth may be influenced by factors such as the age or standard of living of participants. Q studies are traditionally based on small-scale of samples, which fits exploratory purposes. It would be interesting to supplement this work with a quantitative study examining the different views to be found in a large-scale sample. Cross-national investigations would also be helpful (Kountouris and Remoundou 2016).

Lastly, our study focused on perceptions, leaving aside daily behaviours. While Q factors are supposedly operant, a chiasm may exist between the understanding of a concept, its acceptance, and its implementation in daily life. Several future research opportunities are afforded. Both qualitative and quantitative methods could be useful. Insights about the specificity and diversity of behaviours that each profile adopted could be gained through the use of qualitative consumption diaries. More quantitative approaches could also be informative. For instance, calculating an individual's willingness to pay for the emergence of degrowth within society would represent a valuable contribution. More precisely, it would be interesting to assess how much

consumption participants would be willing to give up in order to reduce growth and/or benefit the environment.

The degrowth stream of thought appears to be a stimulating topic for academics and is now spreading in daily life and in the opinions of citizens. Many avenues are open at the empirical level. This should encourage the pursuit of further research and the implementation of degrowth actions.

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Appendices

Appendix A

Empirical Studies Dedicated to Degrowth

Author and Year	Topic	Sample	Methodology	Main Results
Cattaneo, Gavaldà, 2010. Journal of Cleaner Production	A chosen degrowth lifestyle in two Spanish 'urban squats' (located in an urban area but with rural features)	The population of two rurban squats' in Barcelona	Ex post methodology with an inductive process as it relies on an observation of a pre-existing reality with three qualitative and one quantitative tools: participant observation, ethnographic investigation, auto-ethnographic investigation as authors are first hand participants in rurban squatting and a metabolic profile study with statistics on rurban squatters energy consumption.	These squats were not created with a philosophy of degrowth but they have characteristics of this movement (autonomous thanks to renewable energy, compost, permaculture...) with a significantly lower ecological footprint per inhabitant than the rest of Spain. The political dynamic of these squats is oriented towards a direct democracy without hierarchy. This example shows that to be achieved, degrowth with a high standard of living must take into account political and social transition but not only energy and goods. This chosen way of life shows that public acceptance and voluntarism is fundamental for a successful degrowing way of life.

Author and Year	Topic	Sample	Methodology	Main Results
Borowy, 2013. Journal of Cleaner Production	A forced application of degrowth in Cuba after an economic crisis and the collapse of the communist block during the nineties.	Quantitative and Integral study on the Cuban inhabitants and their way of life thanks to economic and public health data. They were provided by the World Health Organization, Cuban authorities, databases about GDP, mortality and growth rates.	Juxtaposition of health data to those in Russia (which suffers a similar economic crisis at that period) to lead a comparative study. Readjusted data calculated with the fictitious static age structure to study real effects of this crisis on public health	Socio-economic changes induced by the Cuban crisis forced the population to live under the rules of degrowth like shifting agricultural methods, simple lifestyle, low energy consumption with replacement of fossil fuels by cycling. Results and data show that Cuba maintained a decent level of public health which was one of the most important priority. This case study underlines the crucial role of government and public sector even if some problems with ambulance and garbage removals appeared during this period.

Author and Year	Topic	Sample	Methodology	Main Results
Videira, Schneider, Sekulova, Kallis, 2014. Futures	A conference in Barcelona for proposals of a fertile ground for degrowth in an innovative and participatory process to find solutions and elaborate future scenarios	Conference with 500 persons in 29 themes. For each step, the number of participants is variable (for example 15 for the mapping of degrowth) but most were researchers or activists engaged in degrowth policies	Causal loop diagram and mapping to study communication of dynamic simulation models and representation of causal links between variables as a conceptualization tool in group setting. This study was divided into four steps between 2010 and 2012: Preliminary questionnaires, workshops "mapping degrowth", European Society for the Ecological Economics Istanbul session, analysis and synthesis of results	This research process outlines degrowth pathways and effectiveness of each proposal. Five themes are studied: education, max-min income levels, sharing of goods and infrastructures, 100 per cent reserve bank, trade degrowth, resource sanctuaries. This study questions the implementation, mid term effects, long term ends, risks, side effects and uncertainties of each issue and the complementary between proposals in order to deliberate on degrowth in plausible future pathways.
Ančić and Domazet, 2015. Teorija in praksa	Shift towards 'non-growth' oriented societies and social implications	Data from eighteen European countries from the International Social Survey Program between 2009 and 2011	Measurement of degrowth through several indicators to study the willingness to sacrifice materials in order to protect environment. Scale ranking of indicators to evaluate agreement or not of behaviours and habits on the trade-off between growth and environment. We note that some information about the construction of the database are not available in the article.	Regarding indicators of degrowth and environment, inhabitants of most countries have unsustainable behaviours. Socio-cultural conditions have an impact on degrowth but even if younger 'European degrowther' support an active degrowth; in most countries both rich and poor population following degrowth values are a small minority.

Author and Year	Topic	Sample	Methodology	Main Results
Stevenson, 2019. Journal of Environmental Policy and Planning	Perception of green political economy	40 English and Spanish speakers, from civil society, intergovern-mental organization...	Q methodology with a Q sort of 48 statements selected from a corpus of 147 documents.	Three main viewpoints: radical transformationism (post-growth vision), cooperative reformism and state progressivism (linked with well-being and happiness).
Joutsenvirta, 2016. Ecological Economics	How timebanking shows the challenges of a bottom up organization on the steps of degrowth	This study focuses on Finnish Timebanking activists and tax authorities	Study of social media, newspapers and political announcement to study the conflict on this alternative economy in a Nordic country	Timebanking promotes human relationships compared to market links. This study underlines a real constitutional conflict between activists and authorities but shows also that interest for timebanking increases during recessions and economic crisis. It can represent an issue for a future economy, especially if public acceptance increases.
Weber, Cabras, Calaf-Forn , Puig-Ventosa, D'alisa, 2019. Ecological Economics	'Waste degrowth' to promote collaborative consumption, compost, recycling initiatives and to encourage the general movement of decrease in materials and production	Four municipalities in Spain (all tourist destinations with seasonal variations of waste) with a UP (model of municipal solid waste to manage consumption and 'end of life' waste) scheme and pay per bag system	Quantitative study based on information of technical assessment of the UP scheme supplied by each municipality to study effects of UP on waste Qualitative study with 26 interviews of local administrators and managers to design views and perception of UP and its efficiency	Researchers were both insider and outsider of local authorities to help them and to keep detachment with results. UP induces a general amelioration of waste management with less waste and more recycling. The application of the waste degrowth works even if there are some free riders issues. However, waste degrowth is a more general behavior than just a decrease of waste; it is a general reconfiguration of waste dispositions and a decrease in materials production on the way to degrowth.

Appendix B

Factor Arrays for Sounds

No of sound	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
1	0	0	0	0	0
2	0	0	0	3	1
3	1	0	1	0	3
4	-2	-1	-1	0	0
5	-3	-1	0	-1	0
6	-1	1	2	0	0
7	0	2	0	1	-2
8	0	0	1	0	0
9	-2	-3	-3	-1	0
10	0	3	-1	-3	0
11	-1	0	3	-2	2
12	0	0	0	-2	0
13	-1	0	-1	0	-1
14	-1	-2	1	-1	0
15	3	2	2	1	-1
16	0	2	0	0	0
17	1	0	3	0	2
18	-3	-2	-2	0	-1
19	0	0	-3	0	0
20	2	0	1	2	-3
21	3	1	0	3	1
22	0	1	0	1	2
23	1	0	-2	-1	-3
24	2	1	0	2	0
25	-2	-2	0	-1	-1
26	0	-1	-1	-2	-2
27	0	-1	-1	-3	-2
28	0	0	-2	-1	3
29	2	-3	0	1	1
30	1	3	2	2	1
31	0	0	0	0	0

Appendix C

Factor Arrays for Pictures

No of image	Factor 1	Factor 2	Factor 3	Factor 4
1	1	-1	0	3
2	-2	-2	-2	0
3	2	0	-3	0
4	-2	-1	-1	-1
5	3	-2	3	1
6	-3	-3	-1	0
7	1	1	0	-3
8	1	-2	0	1
9	-3	-3	0	-2
10	0	0	-3	3
11	3	0	3	1
12	0	1	-3	-2
13	-3	1	-2	1
14	0	-1	0	0
15	-1	0	-1	0
16	-2	0	1	-2
17	0	0	-1	2
18	1	2	0	0
19	-2	1	2	3
20	0	1	3	-1
21	2	0	-1	1
22	0	-1	2	0
23	1	1	0	0
24	1	2	-2	2
25	-1	0	0	-1
26	-1	3	1	-2
27	-1	-3	-3	1
28	-2	0	1	-1
29	0	-1	1	-2
30	0	2	-1	0
31	-1	3	2	-1
32	2	-1	0	-3
33	-1	0	0	-1
34	-1	0	-3	-2
35	1	-1	1	3
36	2	-2	1	1
37	0	3	0	2
38	-3	-3	0	-1
39	3	2	-1	-1
40	-1	-1	1	0
41	0	2	1	2
42	1	-2	3	-3
43	0	2	0	-3
44	3	0	-2	2
45	2	-2	-1	1

Appendix D

Factor Arrays for Statements

No of text	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
1	-1	0	-1	-1	2	-1
2	2	2	-2	1	1	1
3	1	-1	-1	-3	0	0
4	1	0	2	0	0	2
5	-2	1	-3	-3	1	-1
6	-1	2	0	0	-1	0
7	0	0	-2	1	0	3
8	0	0	0	-2	3	-1
9	0	1	-3	2	0	0
10	-1	1	-1	0	-1	-2
11	2	0	1	1	3	3
12	-1	0	1	1	0	-3
13	0	2	0	0	-1	1
14	-2	1	0	-2	1	-2
15	0	-1	0	1	-2	-1
16	0	-2	0	3	-2	0
17	-1	2	2	0	0	-1
18	2	-2	0	1	1	2
19	2	-2	3	0	2	1
20	0	1	2	-3	-2	1
21	-1	-2	-1	-1	-1	-1
22	1	3	2	-1	0	0
23	1	0	-1	3	1	2
24	0	0	3	2	0	2
25	3	0	0	0	0	1
26	1	-1	-2	0	0	-2
27	-2	1	-1	1	-1	-2
28	1	-3	-2	-2	1	1
29	-1	-1	0	-1	1	0
30	3	0	-1	0	2	0
31	0	-1	0	-1	-1	0
32	1	-3	0	1	0	-1
33	-3	1	1	0	1	-3
34	-3	-1	1	-1	-3	0
35	-2	-1	1	-1	-3	1
36	0	0	1	2	-2	0
37	0	3	1	-2	-1	0

Appendix E

Individual Loadings on Each Factor for the Verbal Sorting

QSORT	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
MC	0.765X	-0.271	0.01	-0.01	0.1568	0.0899
CQ	0.3426	-0.2767	0.4929	0.1608	0.5899	0.2438
HB	0.3231	-0.0635	0.1412	0.0601	0.0489	0.8537X
AC	0.803X	-0.1203	0.01	-0.0047	-0.07	0.3315
ZC	0.2511	-0.0138	0.1017	0.732X	0.2936	0.1157
AR	0.5935	-0.1195	0.0749	0.311	0.3354	0.3522
AL	0.5724X	0.0132	-0.0206	0.2598	0.2008	0.3973
SN	-0.0371	0.0284	0.0278	0.7706X	-0.2404	-0.0238
DR	0.1442	-0.159	-0.8032X	0.0161	0.091	-0.0534
PY	-0.0895	0.3822	0.22	-0.4124	0.111	-0.4622
CL	0.3108	-0.3763	0.5341X	0.2306	0.2247	0.1438
MEV	0.6338	-0.0119	0.5623	-0.1248	0.0704	0.3064
GB	0.7609X	0.2591	0.1005	0.1832	0.1652	0.1311
LV	0.4096	0.404	0.1476	0.0962	0.3607	0.3524
LF	0.118	0.1637	0.1519	0.016	0.6367X	0.4948
MH	0.4542	0.1647	0.1122	-0.0366	0.4513	0.5275
AB	0.3231	-0.635	0.1412	0.0601	0.0489	0.8537X
NY	0.1717	-0.043	-0.1108	-0.0752	0.8607X	-0.126
MSS	-0.1018	0.9089X	0.0086	0.0378	-0.0168	-0.0521
DA	0.6874X	-0.1288	-0.052	0.138	0.3484	0.2414
TY	0.4873	0.1376	-0.1708	0.4577	0.3779	0.1401
% expl. Var	22	8	8	9	12	14

Appendix F

Individual Loadings on Each Factor for the Auditory Q Sorting

QSORT	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
HB	0.7538X	0.3563	0.2706	0.3015	0.1312
DA	0.6445	0.4397	0.3302	0.0916	0.3309
AC	0.6738X	0.2060	0.3426	0.0081	0.0148
TY	0.3352	0.5433	0.3299	0.4533	0.2361
MEV	0.1057	0.1966	0.5343X	0.2704	-0.0250
GB	0.2466	0.6012X	0.3814	-0.2221	-0.2125
MSS	0.2052	-0.0869	0.0821	-0.7993X	-0.0935
NY	0.4081	0.2972	0.1890	0-0.0538	0.5579X
RY	-0.0439	0.0326	0.0730	0.1085	0.9177X
LA	0.2864	0.1064	0.4870	0.6755X	-0.0021
AR	0.8286X	0.2376	0.0988	0.1383	-0.0887
LV	0.3086	0.7731X	-0.0211	0.3090	0.0704
DR	0.1753	0.1243	0.8120X	-0.0628	0.2358
LC	0.8498X	-0.0565	-0.1140	0.3571	0.0573
MH	0.0293	0.7163X	0.3330	0.1825	0.1521
ZC	0.5759	-0.2099	0.5298	-0.0063	0.3304
SJ	-0.432	-0.5878X	0.3176	0.4389	-0.1420
% expl. Var	22	16	14	12	9

Appendix G

Individual Loadings on Each Factor for the Visual Q Sorting

QSORT	Factor 1	Factor 2	Factor 3	Factor 4
AC	0.1079	0.4481	0.4509	0.3424
DR	-0.0787	0.0737	0.8623X	-0.1281
PY	0.0145	-0.8437X	-0.0080	0.0621
DA	0.8324X	0.2171	0.0957	-0.0353
CL	0.0716	-0.3485	-0.0097	0.7959X
AR	0.7038X	0.0366	0.1788	0.2590
NSP	0.4584	0.6617X	0.0831	0.1769
IF	0.2572	-0.0501	0.6591X	0.0141
TY	0.6421X	0.3947	-0.1573	-0.2200
MH	0.5529X	0.2852	0.3269	-0.1442
AB	0.6384X	0.4122	0.2210	0.1529
LV	0.6154X	0.1354	0.0019	0.3466
CQ	0.1368	0.3109	-0.0955	0.7674X
RY	0.6658X	-0.0388	0.0206	0.0562
MC	0.8085X	-0.1545	0.0787	0.2771
ZC	0.4341	0.2760	-0.0022	0.3991
% expl. Var	27	13	10	12

Appendix H

Individual Loadings on Each Factor for the Visual Re-Test

QSORT	Factor 1	Factor 2	Factor 3
1	0.1931	-0.4618	0.6394X
2	0.8573X	0.1949	0.0611
3	-0.1905	0.4466	-0.6430X
4	0.5803	-0.6229	0.0412
5	-0.1827	0.6898X	-0.2773
6	0.7880X	-0.0895	0.2491
7	0.7757X	-0.0961	-0.2193
8	0.1691	0.8982X	-0.0897
9	0.7830X	-0.4326	-0.0298
10	-0.2077	0.0432	0.8338X

Appendix I

Q Sample Items

Text-based Q Sample	Image-based Q Sample	Sound-based Q Sample
1. That should be the role of the government	1. Buddhist monk in meditation	1. Train horn
2. It's an anti-capitalist logic	2. Booming modern city	2. The International
3. It's more democracy	3. Japanese room	3. Typewriter
4. It's more fair	4. Slum in Manila	4. Machine gun
5. It's utopia	5. Pierre Rabhi, French organic farmer and environmentalist	5. Motorbikes
6. It is oligarchy	6. Image of a baby with logos of different brands	6. Tram door opener
7. It is a necessity for developed countries	7. Minimalist wooden house	7. Step
8. It is a long term commitment	8. Thinking monkey	8. Percussion
9. It is negative growth	9. Black Friday in the US	9. Slimming pub
10. It is giving up technology	10. Use of a plastic bottle vs. a jug of water	10. Laughter
11. It is prosperity without growth	11. Ecological house	11. Siren
12. It is consumption deprivation	12. Lithograph of the Paris City Hall fire during the Commune	12. Alarm sound
13. It's about sharing the wealth	13. Businessman eating everything in sight	13. Ringing phone
14. It would lead to unemployment	14. Graph with a decreasing arrow	14. Exchange rate
15. Corresponds to the relocation of activity	15. Hippies on a bus	15. Bicycle
16. It is a more targeted development	16. Cavemen	16. Yiha!
17. It is about alerting people	17. Mountains in Colombia	17. Heartbeat
18. A life with more meaning	18. PVC sign No cars, motorbikes or mopeds allowed	18. Supermarket checkout
19. It is progress	19. Warning sign: no turning back	19. Cantatrice
20. It is the right to be lazy	20. Warning sign: slow down on the road	20. Bird song 1
21. Corresponds to population regulation	21. Painting by Van Gogh- The nap	21. Bird song 2
22. Comes from the discontent of the current society	22. Sick person breathing O2 from the tree	22. Hammer
23. It means consuming less natural resources	23. Couple fishing at the water's edge	23. Bell tower
24. It means: sustainable	24. Four children frolicking in nature	24. Rooster
25. It means: sobriety	25. Gainsbourg burning a 500 franc note	25. Confidential code
26. The only option to save the planet	26. Symbol of communism	26. Alien
27. It is too late		27. Game over signal
28. This is the hope		28. Generic Television News
		29. Water drop
		30. Hakuna Matata
		31. SNCF jingle

29. It arouses my curiosity 30. It requires willpower 31. It is simply realism 32. It arouses my optimism 33. I feel suspicious 34. It's a bobo thing 35. It's a hippy thing 36. It means: a better quality of industry 37. It is the logical consequence of the double economic and ecological crisis	27. Steak in full decomposition 28. Intensive agriculture 29. Traditional way of life of the !kung tribe 30. Piano destroyed by a tree 31. Symbol of prohibition to use money 32. A house powered by a solar panel and a wind turbine 33. Image of a green city 34. Painting of the raft of the Medusa made between 1818 and 1819 35. Man collecting waste in the snow 36. Symbol of recycling 37. Letterbox with a "STOP PUB" sign 38. Sculpture The Supermarket Lady, Duane Hanson 39. Barter between two agents 40. Arrival of a tsunami 41. People on bicycles 42. Photo of a woman living in autarky 43. Utopia of an ecological city 44. Photo of volunteers 45. Mongolian yurt	