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Comparison of the Representation of Homeopathy from Different Students Audiences

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Introduction

This study is part of the HOMEOCSS societal research project (www.projet-homeoccs.com) and more particularly in OBJ1, an object of study relating to a student audience.

This work is based on a comparative study of the social representations of different student audiences at the University of Dijon, France (Medicine, Life and Earth Science and Psychology) on the subject of "homeopathy", and will give a first approach to this object of study. The challenge will be to better understand the representations of different student audiences in order to identify if the training curriculum can have an influence on their representations.

Concept of societal controversy

The controversy seems to be, for many authors, a place of compulsory debate structuring knowledge. Controversies are "effervescent moments" as Durkheim tells us (Durkheim, 1900).

"The controversy changes form as soon as the statements circulate in other arenas. We then come out of scholarly controversy to enter the framework of public controversy, controversy and quarrel", indicates Lilti (2007: 18). But in all cases it aims, as Pestre states (2007: 35), "to an axiological neutrality vis-à-vis the actors and their values."

Homeopathy is the subject of public controversy that will be characterized as a socio-scientific controversy. Indeed, this object has been and is still very controversial within the academic and scientific sphere. Through its history, homeopathy has always oscillated between challenge and integration (Faure, 2002).

Homeopathy is based on the principle of similarity, set out by Hahnemann in 1810. The new therapy is then accused of many shocking contradictions, many palpable absurdities (Bariety, 1970).

The scandal in the memory of water affair or the Benveniste affair, in the late 1980s and during the 1990s, discredited the work of immunologist Jacques Benveniste and his team at INSERM. The Academy of Medicine once again condemned, in 2004, a "method devised 200 years ago, from unscientific foundations." This case, which began with the publication of a series of articles in the journal Nature, allowed the analysis of the dynamics of the controversial process, namely the succession of three phases of containment, deconfinement and reconfiguration of the debate (Ragouet, 2014). Two arenas were then defined at the heart of the controversy: the academic and media arenas.

The scientific controversy has continued to this day. A certain number of doctors and scientists consider that the controversy no longer exists in the scientific sphere, (Lauche et al., 2015; Hawke et al., 2018) others consider that it remains current (Montagnier et al., 2009; Henry et al., 2016).

Since 2018, news in France have called into question the scientificity of homeopathy, involving the Academies of Medicine and Pharmacy, the High Authority for Health and health professionals from different groups. Homeopathy is equated to a placebo effect, an opinion which is based in particular on the last Australian study compiling the data (NHMRC, 2013), as well as on the report of the scientific council of the European academies of sciences (EASAC, 2017). Defenders claim its scientific integrity, stating that it must be studied in a frame of reference adapted from the normative scientific framework. They are based in particular on the latest Swiss study (Bornhoft & Matthiessen, 2011) going in this direction and on the EPI 3 study carried out from 2006 to 2010, (Grimaldi-Bensouda et al., 2016) for example.

From a more general point of view, the WHO in 2002 (WHO, 2002) differentiates conventional medicines from non-conventional or complementary medicines which are used in parallel in developed countries (Europe, North America). Among the non-conventional medicines (MNC), the most frequent and best recognized at a European level, we find homeopathy. Europe has chosen the term "alternative

medicine" in its official texts. The CAMbrella research study, funded by a European project (CAMbrella, 2012) and carried out from January 2010 to December 2012 in 39 European countries, made it possible to assess the use and regulation of each non-conventional medicine, including homeopathy. Through this survey, we can see that the popularity of these therapies differs greatly depending on the country. Among the MNCs, homeopathy is considered to be the most used in Europe. However, no European law has been passed for the official recognition of homeopathy, which leads to a variability of practices.

A new European legislation regulates the marketing of homeopathic medicines but does not standardize practices across countries. Indeed, The Council of Europe adopted a new resolution on June 11, 1999 aiming to facilitate access to these non-conventional medicines for every European citizen, for a better harmonization to be achieved between each state (European Commission, 1999).

France is the leading consumer and exporter country (CAMbrella, 2012). The latest IPSOS 2018 survey indicates that 77% of French people have already taken homeopathy in their lifetime and that 58% have taken it several times. 76% have a positive image of homeopathic medicine. According to the IPSOS 2012 survey, 56% of French people use homeopathy for treatment, 36% of which on a regular basis.

Concept of social representations

The theory of social representations dates from 1961 and the works of Serge Moscovici (1961). These works were furthered by the works of Abric (2011) on the nature of the central core of the representation. He has indeed enriched the theoretical framework by showing that the representation is composed of a central nucleus or central system and peripheral elements. Representations can be defined as "a set of opinions, informations, values and beliefs about a particular object" (De Carlos, 2015: 34).

The central core has two dimensions (De Carlos, 2015):

- A normative or evaluative dimension: the central elements are constituted by a norm, a social value, a stereotype or a dominant attitude towards the object of the representation.
- A functional or descriptive dimension: the central elements are those which directly concern the accomplishment of a task.

The aim of this study will be to identify the central nucleus of each group of students in order to compare them and to define whether these representations seem distinct or not.

The notion of social representations is integrated into the theory of social thought (Rouquette, 1973). Social representations find their justification in the ideology defined by beliefs, values, norms, and thêmata. Ideology would be the most stable and transverse level in the group. Furthermore, social representation seems to be structured through two processes: objectification and anchoring. According to Moscovici (1961), objectification is defined as the phenomenon making it possible to appropriate and integrate knowledge relating to the object, and the anchoring consist in socially rooting the representation and its object in the subject's value system. "The

anchoring phenomenon operates in different ways according to social groups. The culture and values specific to a group mean that a social object will not be integrated in the same way and that it will take on a specific form for a group" (De Carlos, 2015: 45). This study will try to characterize the ideology which underlies the homeopathy object (norms, values, thêmata, beliefs) and to re-situate it in the phenomenon of objectification, within the representations of students, the phenomenon of anchoring requiring a methodology of complementary narrative interviews.

The socio-dynamic models of representations (multidimensional analysis approach and factorial analysis of correspondences) and structural (allowing access to the content of the representation) described in the methodology section will be used in this study in order to approach the core of the representations of the homeopathy object.

Methodology

Anonymity and data security

In compliance with the European GDPR data protection regulations applicable since May 25, 2018, when submitting the questionnaire, a recorded written consent request relating to the anonymity of the data was previously submitted in order to have the agreement of the public studied. The data was made anonymous once it was obtained. The data retention period has been indicated on the HOMEOCSS project website at www.projet-homeocss.com. All sensitive data was secured by Axcrypt version 2.1.1573.0 encryption software coupled with a strong password. The encrypted data was also saved on external media.

The questionnaires submitted

"The questionnaire remains the most widely used technique in the study of representations.[…] Recent methods of analysis reinforce the privileged place of the questionnaire" (Abric, 2011: 76).

In addition, the questionnaire provides standardization, adds Abric (2011), reducing the subjective risks of the collection and the inter-individual variations in the subjects' expression. However, this standardization also determines limits. Abric specifies that the "questionnaire necessarily limits the expression of individuals to the strict questions which are offered to it and which can avoid the subject's own questions" (Abric, 2011: 77). Besides, it seems that "One of the ways to reduce these difficulties is to use more open questions, offering the interviewee a wide range of answers, that is to say, offering him the possibility of implementing his own approach." (*ibid*.)

Hence, two questionnaires Q1 and Q2 were submitted, questionnaires comprising more or less open questions allowing the expression of the student audience. The precise methodology was published in a chapter of book (Kessouar et al., 2020). These questionnaires were offered on the free platform LimeSurvey version 2.65.0 in order to be accessible online. All the questionnaires and responses were recorded on the platform of the University of Burgundy's polling server, which is secure and which hosts this software.

The Q1 questionnaire, with a mainly contextualizing function, will not be presented and analyzed in this study. Within the Q2 questionnaire, three questions were analyzed so as to highlight the core of the representation.

Questionnaire 2

1. List words that come to mind when you hear the word "homeopathy".
2. Have you ever heard of homeopathy?
3. Do you know what homeopathy is?
   If yes, what is homeopathy for you?

Target audience

The target audience is made up of students aged between 18 and 25 from different university departments: students of Medicine, Psychology and Life and Earth Sciences.

The selected departments were chosen based on their links with care, medication and understanding of the body, though each reflecting a different dominant approaches: one mainly related to treatment and care (students of UFR Medicine), the other of a psychological nature, that is to say mainly related to the mind/psyche (students of UFR Psychology), the last predominantly physiological, related to the functioning of the body (students of UFR Life and earth sciences). In order to carry out the data collection and reach the target university audience, a request for agreement with the deans of each UFR was submitted.

Similarity analyzes and factorial correspondence analysis using IRaMuTeQ software – R software (0.7 alpha 2 version)

IRaMuTeQ software is a free software created by Pierre Ratinaud allowing multidimensional analyzes of texts and questionnaires thanks to its interface with statistical software R. It uses analysis keys equivalent to the categorical keys of ALCESTE. It allows an analysis of similarities (ANOSIM) which offers the possibility of identifying the core of social representation and its periphery by relying on a statistical analysis of the Chi-square type. Factorial analyzes of correspondences also relying on an analysis Chi-square statistics (CFA) identify the anchoring of social representation. Indeed, "ANOSIM views corpora in a completely different way. The approach is more local, based on properties of connectedness of the corpus. […] This algorithm tends to strengthen the neighborly relationships between the shapes." (Salone, 2013: 2). "The CFA, based on inertia calculations of the word cloud that constitutes a corpus, makes the oppositions or reconciliations more visible. […] The CFA proposed are performed after lemmatization and are twofold. Their graphical representations of the point cloud are two-dimensional in the hyperplane defined by the first two factors" (*ibid.*). They will therefore be used for this study.

Chi-square statistical test for homogeneity

The objective of this statistical test is to compare several observed distributions. The distributions observed (in our case the students evaluating the homeopathy object differently) will be compared by considering each population as a sample for which a theoretical pseudo-distribution is calculated.

The Chi-square calculation is performed using the formula:

$$Q = \sum_{j=1}^{\text{nombre de cases du tableau}} \frac{(O_j - A_j)^1}{A_j}$$

for which the dof (degree of freedom) will be calculated from the formula (k – 1) x (m – 1) where k = any number of modalities and m = any number of population.

Qc is compared to Kddl; 0.05 according to the Chi-square table according to the degree of freedom and the chosen probability which will be here of p = 0.05. If Qc <Kddl; 0.05, so it has not been shown that the distributions differ. If Qc> Kddl; 0.05, then the two observed distributions differ significantly.

The impact of gender and the impact of educational attainment on the observed distribution will be analyzed.

Results – Discussion

Number of participants and profiles

For all of the different courses surveyed, only the complete responses to the questionnaires were kept (Table 1). It appears that 139 Medicine students agreed to answer the Q2 questionnaire entirely, including 103 girls and 36 boys. The levels of education shown vary widely from the first year of PACES to the ninth year of Medicine. It seems that the number of girls in this type of sector is predominant (around 60%), which could explain the greater number of responses from girls. For the Life and Earth Sciences course, 91 students from License 1 to Master 1 preparation for the teaching profession agreed to completely answer the questionnaire submitted, with a proportion of responses once again in favor of girls: 76 girls versus 20 boys. The distribution within the curriculum (between 60 and 70% of girls) can here again explain this imbalance. Regarding the Psychology course, 208 students from License 1 to License 3 agreed to answer the questionnaire entirely, including 189 girls and 19 boys. Once again, the predominant distribution of girls (70 to 80%) in the curriculum may explain this imbalance. However, in the context of this study, the results will be weighted when applying a Chi-square of homogeneity so that the analyzes of gender and of the impact of the level of study are not biased.

[1] chart's number of cells

Table 1: Number of complete responses to the Q2 questionnaire submitted according to the student audience interviewed. Three types of training course have been targeted: Medicine, Life and earth sciences and Psychology.

	Number of participants (complete answers)	Number of girls	Number of boys
Students of Medicine (1st to 9th year)	139	103	36
Students of Life and earth sciences (L1 to M1)	91	76	20
Students of Psychology (L1 to L3)	208	189	19

Definition of a common classification criterion for the subjects interviewed

To define a classification criterion for the subjects interviewed, discourse analysis was carried out. It emerges from this analysis that the action of homeopathy is conceived either as a placebo effect, or as a medicine with its own efficacity. These observations made it possible to establish two broad categories according to whether the students perceived homeopathy one or the other way.

Homeopathy representations of the students interviewed

All of the students interviewed say they have already heard of homeopathy around them (Table 2) with the exception of 2 students in Life and earth sciences (1 boy and 1 girl) and 8 students in Psychology (7 girls and 1 boy).

Among the targeted students, a majority believes they know what homeopathy is and are able to define it. A small proportion (Table 2: 14 Medicine students, 16 Life and earth sciences students and 57 Psychology students) think they do not know what homeopathy is and therefore have not defined it. It should be noted that looking at the proportions, only 10% of Medical students feel they do not know what homeopathy is, 17% for Life and earth sciences students and 28% for Psychology students. It is likely that the contribution of medical training on the subject of homeopathy can lead students in this course to feel better able to know the subject and assess it. The same goes for Life and earth sciences students thanks to information or presentations dealing with the subject (as some students indicate in their remarks).

Among those students who felt they knew what homeopathy was, they were asked to explain what it was like to them. The following three similarity analyzes (Figures 1, 2 and 3) indicate results which allow us to identify the core of the representation defined on the basis of the answers to question 3 of the questionnaire. Figure 1 is for Medicine students (n = 125), Figure 2 is for Life and earth sciences students (n = 75) and Figure 3 is for Psychology students (n = 151).

Table 2. Number of responses from students interviewed according to their training course to two questions identified and analyzed on homeopathy from the Q2 questionnaire submitted.

	Students of Medicine	Students of Life and earth sciences	Students of Psychology
Have you ever heard of Homeopathy?	Yes: 139 No: 0	Yes: 89 No: 2	Yes: 200 No: 8
Do you know what Homeopathy is?	Yes: 125 No: 14	Yes: 75 No: 16	Yes: 151 No: 57

- Homeopathy representations of Medical students:

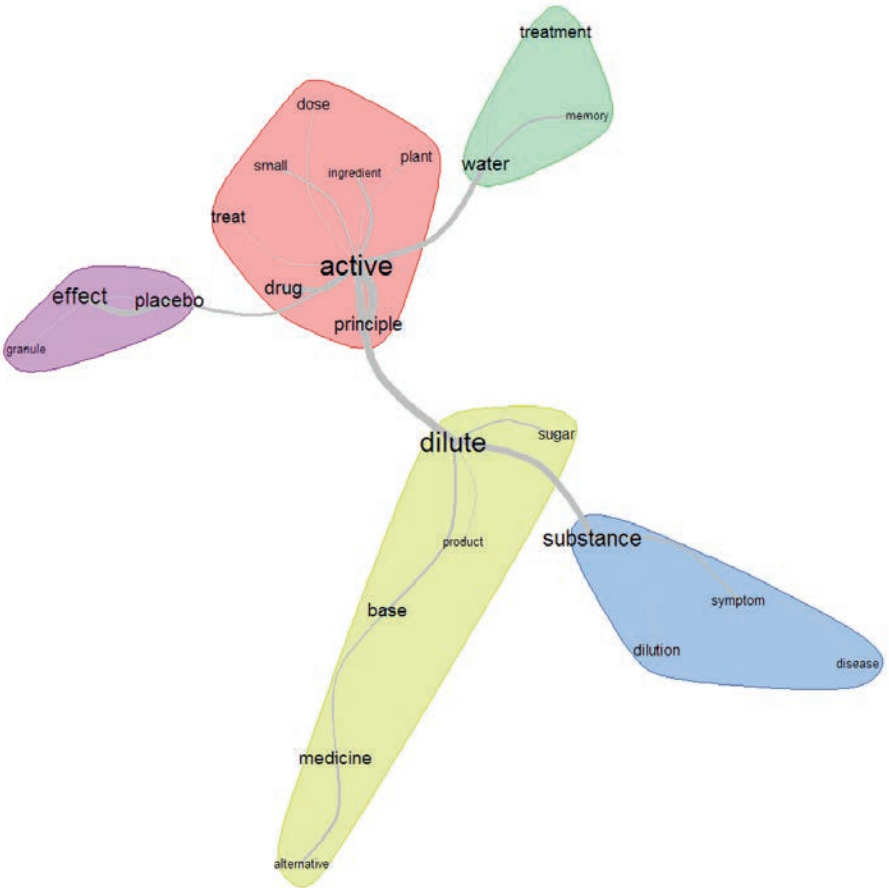

Figure 1. Similarity analysis based on co-occurrences using IRaMuTeQ-R software from Medicine students, n = 125. The size of the text is proportional to the frequency related to Chi-square, the thicker the links/edges, the more the more co-occurring words. The lexical communities linked to the co-occurring forces are identified in colored halos. The prepositions and conjunctions have been removed in order to make the figure easier to read.

Table 3. Distribution of the number of Medicine students according to their gender or according to their year of study evaluating homeopathy as an active principle so diluted that its only effect takes place by placebo effect or evaluating homeopathy as a diluted active principle having a clean action via natural medicine. n = 125 students interviewed (93 girls and 32 boys). The distribution of students year by year from the second year to the 9th year is not significant. The number of students has therefore been cumulated in order to compare it with the first year with which the differences are significant

	Homeopathy assessment: Placebo effect's action	**Homeopathy assessment: Effective natural medicine**
Total Number of Medicine students interviewed	60	65
Number of girls	39	54
Number of boys	21	11
Number of 1st year students	22	48
Number of students from 2nd to 9th year	38	18

The students of Medicine evaluate homeopathy according to the forces of cooccurrences found in the analysis of similarity (Fig. 1), in order, like: an active ingredient which has been diluted can be a drug or a so-called medicine, based on the principle of water memory (rightly or wrongly), possibly alternative medicine and/or a substance with a placebo effect.

The analysis of the answers to questions 1 and 3 of the Q2 questionnaire (Table 3), makes it possible to identify the proportion of Medical students evaluating the action of homeopathy as a "placebo effect", i.e. approximately half of the cohort (60 students who answered) and another half evaluating it as "natural medicine with its own action" (65 students). Excerpts from the remarks illustrate this assessment. It should be noted that students mention having approached the subject within the academical context.

Among the students evaluating homeopathy as an "effective natural medicine", we find expressions such as:

- "A therapy which is based on the principle of water memory (scientifically proven fact, which should moreover receive greater attention from the medical field). [...] Masaru Emoto's formidable work on water provides a better understanding of phenomena.", 2nd year Medical student.
- "A herbal medicine", 1st year Medical student.
- "It is a tiny dose of an active ingredient", 1st year Medical student.
- "Soft, natural medicine, based on the administration of granules in a more traditional than scientifically based use.", 1st year Medical student.
- Among the students evaluating the action of homeopathy as a "placebo effect", we find words such as:
- "A fake medicine based on an 18th century postulate focused on infinitesimal dilution, never having proven its effectiveness and presenting a public health problem.", 8th year Medical student.

- "Incredible marketing to make patients believe that this is a gentle and natural method of treatment, when we look at manufacturing with successive dilutions there is really no active ingredient left, and everything is based on the placebo effect", 8th year Medical student.
- "This is a treatment based on the Placebo effect", student in the 1st year of Medicine.

Table 3 shows that of the 93 girls who answered, a greater proportion of them (54 girls) rated homeopathy as an effective natural medicine. Conversely, 39 girls evaluate it as a purely a placebo effect with no specific action. It is interesting to note that out of the small number of boys interviewed (32 in all) the proportion of them evaluating the action of homeopathy as a placebo effect is twice as large, 21 boys, against 11 evaluating it as an effective natural medicine.

In order to define if this distribution was not made at random and if a gender effect exists, a Chi-square statistical test of homogeneity was carried out with the objective of knowing whether the distribution of the two populations of boys and girls differs or not significantly according to the evaluation of the homeopathy object. In this context, the number of students evaluating homeopathy as a placebo action and as a natural medicine were considered statistically as two separate samples. The calculation of the Chiq homogeneity Qc = 5.36 was compared to a K1; 0.05 = 3.84, according to the Chi table 2. With a probability p = 0.05, it appears that Qc> K1; 0.05 therefore H0 is rejected and the distributions differ significantly in the two populations. Groups and sexes are therefore not randomly distributed. So there seems to appear here a gender effect on the evaluation of the homeopathy object for which the girls would more likely evaluate it as an effective natural medicine and the boys as an action by placebo effect.

It is also interesting to note that the distribution of students according to their level of study in Medicine differs according to the evaluation of the homeopathy object. Indeed, the students of Medicine evaluating homeopathy as a natural medicine are essentially 1st year students (48 students out of 65), this evaluation being less often found for students of later years (9 students in 2nd and 4 students in 3rd year and very little if at all after). On the contrary, the students evaluating homeopathy as a placebo effect are essentially students whose level is higher than the 1st year of Medicine since cumulatively 38 students evaluating homeopathy as a placebo effect are divided between years 2 and 9 with a peak in the 5th year represented by 10 students. In order to define whether this distribution is significantly different depending on the year of study, in a similar way a Chi-square test for homogeneity was carried out. The same two samples as above were analyzed separately, but this time not according to the distribution between boys and girls but according to the distribution between 1st year and year greater than or equal to 2. A chi2 of calculated homogeneity Qc = 17.5 was compared to a K1; 0.05 = 3.84. Qc >> K1; 0.05, consequently the distributions according to the years of study differ significantly in the two populations between the 1st year of studies and years of studies equal or greater than 2. It therefore appears here that there is probably an influence of the

training provided on the representation of students in Medicine, and in particular influencing their evaluation of the homeopathy object as having a placebo effect.

A composite drawing of the Medicine student evaluating homeopathy as an effective natural medicine would rather be based on this data, a 1st year Medical student girl. Conversely, the typical Medical student boy evaluating homeopathy as having a placebo effect would be a student with a minimum level of 2nd year of Medicine.

- Homeopathy representations of Life and earth sciences students:

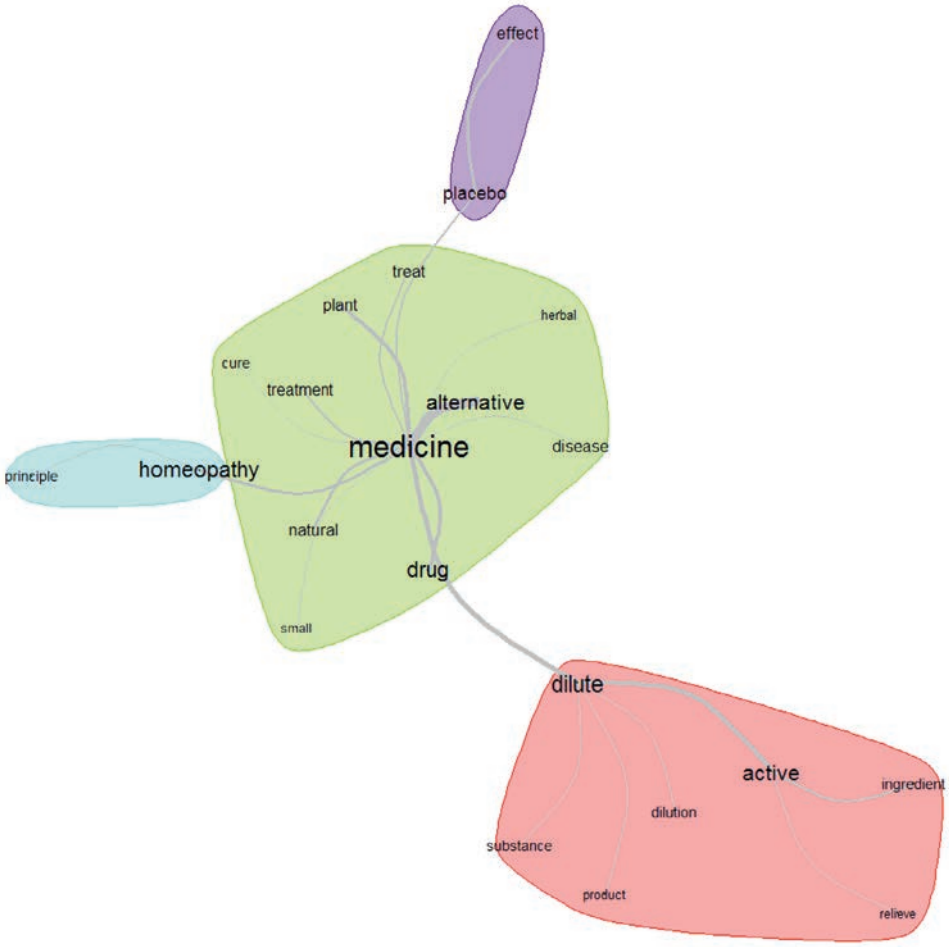

Figure 2. Similarity analysis based on co-occurrences using IRaMuTeQ software-R software from Life and earth sciences students, n = 75. The size of the text is proportional to the frequency related to the Chi-square, the thicker the links/edges, the more co-occurring are the words. The lexical communities linked to the co-occurring forces are identified in colored halos. The prepositions and conjunctions have been removed in order to make the figure easier to read.

Table 4. Distribution of the number of Life and earth sciences students according to their gender or according to their year of studies evaluating homeopathy as a diluted active ingredient that its only effect takes place by placebo effect or evaluating homeopathy as a diluted active ingredient having a clean action via natural medicine. n = 75 students interviewed (59 girls and 16 boys).

	Homeopathy assessment: Action by placebo effect	Homeopathy Assessment: Natural medicine effective based on dilutions and/or plants
Total number of Life and earth sciences students interviewed	31	44
Number of girls	19	40
Number of boys	12	4
Number of 1st year students	11	16
Number of 2nd year students	9	7
Number of 3rd year students	10	21
Number of 4th year students	1	0

Life and earth sciences students assess homeopathy based on the co-occurrence forces found in the similarity analysis (Fig. 2), in order, as: an active ingredient that has been diluted, which may be a drug or a so-called drug, being an alternative medicine, based on plants, and/or being a substance having a placebo effect.

The analysis of the answers to questions 1 and 3 of the Q2 questionnaire (Table 4), makes it possible to identify the proportion of Life and earth sciences students evaluating the action of homeopathy as a "placebo effect", i.e. slightly less than half of the cohort (31 students who answered) and slightly more than half evaluating it as "natural medicine with its own diluted and/or plant-based action" (44 students). Excerpts from the remarks illustrate this assessment. It should be noted that students mention having approached the subject in the form of lectures in the academical context.

Among the students evaluating homeopathy as an "effective natural medicine with its own diluted action and/or based on plants", we find words such as:

- "A medicine based on similarity and dilution, whose treatment can be personalized", 1st year Life and earth sciences student.
- "Long-term treatment that relieves certain herbal ailments", 1st year Life and earth sciences student.
- "Herbal medicines that help the body in different tasks (I take homeopathy when I have aches)", 1st year Life and earth sciences student.
- "It is to treat with highly diluted drugs, therefore less aggressive, perhaps healthier than real drugs.", 1st year Life and earth sciences student.

Among the students evaluating the action of homeopathy as a "placebo effect", we find words such as:

- "Homeopathy is based on several principles: water memory, dilution and similarity. The principle of similarity claims that to treat a disease, you have to inject the same disease (hence the term homeopathy). On the other hand, according

to the dilution principle, the principle must be diluted until it is no longer there (because honestly, with a 10–15 dilution, there is nothing left!), But since water has a memory as well that a Japanese doctor of alternative medicine has decided (in Japan, they have it) and therefore magic, it works! Homeopathic medicines are therefore small beads of water and sugar which, when subjected to the scientific method, did not show any benefit compared to placebo. However, after this severe observation on homeopathy as a science, I have to say that homeopathic doctors have a real contribution because they listen and make their patients think, which is something that many conventional doctors do not do. Therefore, if it is important to emphasize that homeopathy is a religion and not a science, homeopathic doctors are useful like priests are…", 2nd year Life and earth sciences student.

- "A placebo used to find out if the problem is mental or not.", 1st year Life and earth sciences student.
- "Homeopathy is a form of inactive treatment that allows people who are hypochondriac or think they are sick to feel better…", 1st year Life and earth sciences student.
- "A placebo", 1st year Life and earth sciences student.

Table 4 shows that out of the 59 girls who answered, a greater proportion of them (40 girls) evaluated homeopathy as an effective natural medicine with its own diluted and/or plant-based action. Conversely, 19 girls evaluate it as a purely placebo effect with no specific action. It is interesting to note, as for the students of Medicine, that on the small number of boys questioned (16 in all) the proportion of them evaluating the action of homeopathy as a placebo effect is three times higher, 12 boys, against 4 evaluating it as a natural medicine.

Just as for the Medicine students, in order to define if this distribution was not made at random and if a gender effect exists, a statistical Chi-square test of homogeneity was carried out with the objective of knowing if the distribution of the two populations, boys and girls, differed or not significantly according to the evaluation of the homeopathy object. In this context the calculation of the Chi-square of homogeneity Qc = 9.516 was compared to a K1; 0.05 = 3.84, according to the Chi-square table. With a probability p = 0.05, it appears that Qc> K1; 0.05 therefore H0, is rejected and the distributions differ significantly in the two populations. Groups and sexes are then not randomly distributed. Here too, there appears to be a gender effect on the evaluation of the homeopathy object for which girls preferentially evaluate it as an effective natural medicine with its own diluted and/or plant-based action and boys preferentially as an action by placebo effect.

Unlike Medical students, there does not seem to be a training effect here that could influence the evaluation of the homeopathy object. The distribution of students on the different levels of study according to the assessment was not significantly different.

A composite drawing of the Life and earth sciences student evaluating homeopathy as an effective natural medicine with its own diluted and/or plant-based action would rather be according to these data, a student girl regardless of

the year of study targeted. Conversely, the typical Life and earth sciences student evaluating homeopathy as having a placebo effect would be a student boy regardless of the year of study targeted.

- Homeopathy representations by Psychology students

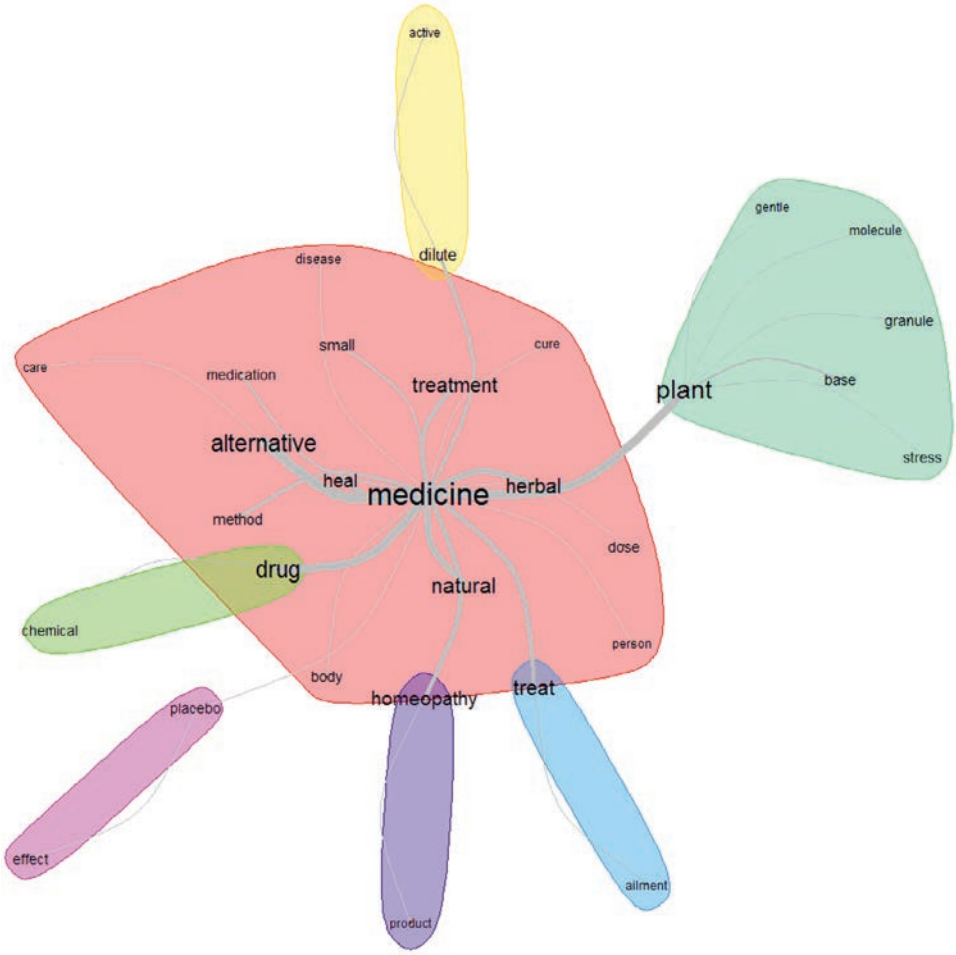

Figure 3. Analysis of similarities based on co-occurrences using IRaMuTeQ-R software from Psychology students, n = 140. The size of the text is proportional to the frequency related to Chi-square, the thickes the links/edges, the more co-occurring words. The lexical communities linked to the co-occurring forces are identified in colored halos. The prepositions and conjunctions have been removed in order to make the figure easier to read.

Table 5. Distribution of the number of students in Psychology according to their gender or according to their year of study evaluating homeopathy as an active principle so diluted that its only effect takes place by placebo effect or evaluating homeopathy as a diluted active principle having an action clean via natural medicine. n = 140 students interviewed (128 girls and 12 boys).

	Homeopathy assessment: Action by placebo effect	**Homeopathy assessment: alternative medicine/herbal medicine that treats**
Total number of Psychology students interviewed	29	111
Number of girls	24	104
Number of boys	5	7
Number of 1st year students	12	58
Number of 2nd year students	5	35
Number of 3rd year students	12	18

Students of Psychology assess homeopathy based on the co-occurring forces found in the similarity analysis (Fig. 3), in order, such as: a herbal medicine and alternative medicine that treats.

The analysis of the answers to questions 1 and 3 of the Q2 questionnaire (Table 5) makes it possible to identify the proportion of Psychology students evaluating the action of homeopathy as a "placebo effect", ie a very small proportion of the workforce (29 students who spoke) and 4/5 evaluating it as "a medicine and a gentle herbal medicine that treats" (111 students). Excerpts from the remarks illustrate this assessment. It should be noted that Psychology students do not mention in their speech having addressed the subject in the academical context.

Among the students evaluating homeopathy as "a medicine and a gentle herbal medicine that treats", we find words such as:

- "Alternative medicine that treats with plants", 2nd year Psychology student.
- "It is a way of healing that responds exclusively to the power of plants and what they have to offer.", 3rd year Psychology student.
- "It is an gentle and alternative medicine which is based on the fact that our body and our immune systems are made in such a way that they would have the capacity to heal themselves, and therefore homeopathy consists in stimulating the processes of self healing.", 3rd year Psychology student.

Among the students evaluating the action of homeopathy as a "placebo effect", we find remarks such as:

- "It is a placebo drug which allows one to believe that it's treating oneself while it's not", 1st year Psychology student.
- "A placebo that heals certain people. However, there is almost no molecule so it is more or less unconscious. It's a magic medicine", 3rd year Psychology student.
- "A big placebo effect", 2nd year Psychology student.

– "Homeopathy is said to be a medicine that relies on "water memory". In reality it is more a piece of sugar containing no trace of active product as it has been diluted. Homeopathy is therefore, very very expensive sugar", 2nd year Psychology student.

From Table 5, it appears that the distribution of girls and boys for each of the evaluations of the homeopathy object remains homogeneous, showing no statistical variation in gender effect unlike the Medical and Life and earth sciences students.

Just as for Life and earth sciences students and conversely for Medical students, there does not seem to emerge here either a training effect that could influence the evaluation of the homeopathy object, the distribution of students on the different levels of study according to their homeopathy assessment not being significantly different.

A composite drawing of the Psychology student evaluating homeopathy as "a healing medicine and herbal medicine" would be based on these data, as would the composite drawing of the student evaluating homeopathy as having a "placebo effect": a student regardless of the targeted year of study.

- Factorial analysis of correspondences of the homeopathy representations of Medicine / Life and earth sciences / Psychology students

The factor analysis is based on the calculation of the differences in independence. It shows that all of the information is reproduced on the hyperplane since in fact the % of information restitution is distributed over the two factors 1 and 2: 87.37% and 12.63% respectively. It makes it possible to highlight the distribution of the nuclei of the representations of the groups of students in relation to each other. In particular, it identifies areas of convergence and divergence.

The distribution of point clouds corresponding to students of Psychology (in green) and in Medicine (in red) shows that their barycenters opposed at 180° reveal an opposition in the social representation of the population groups studied. Indeed, the representation of the group of Psychology students corresponds to an evaluation of homeopathy as a soft medicine acting by plants while the group of Medical students evaluates it as an active principle which has been diluted being able to be a medicine or a so-called medicine, based on the principle of water memory (rightly or wrongly), possibly alternative medicine and/or a substance with a placebo effect. The social representations of these two groups of students therefore seem to be disjointed. If we had been led to compare the individual representations of certain Psychology students and certain Medical students evaluating homeopathy as a natural medicine or even as having a placebo effect, it is very likely that we could nevertheless have found social representations completely joint on a case by case basis for the same evaluation of homeopathy, as shown by the comparison of certain points of the two clouds.

It is interesting to see here that the group of Life and earth sciences students (in blue) is somewhere between the two social representations of Medical and Psychology students. The barycenter of the point cloud being located 90 ° from the barycenter of each of the other two groups, thus mentioning an independence of the population group. However, at least one element present in each representation

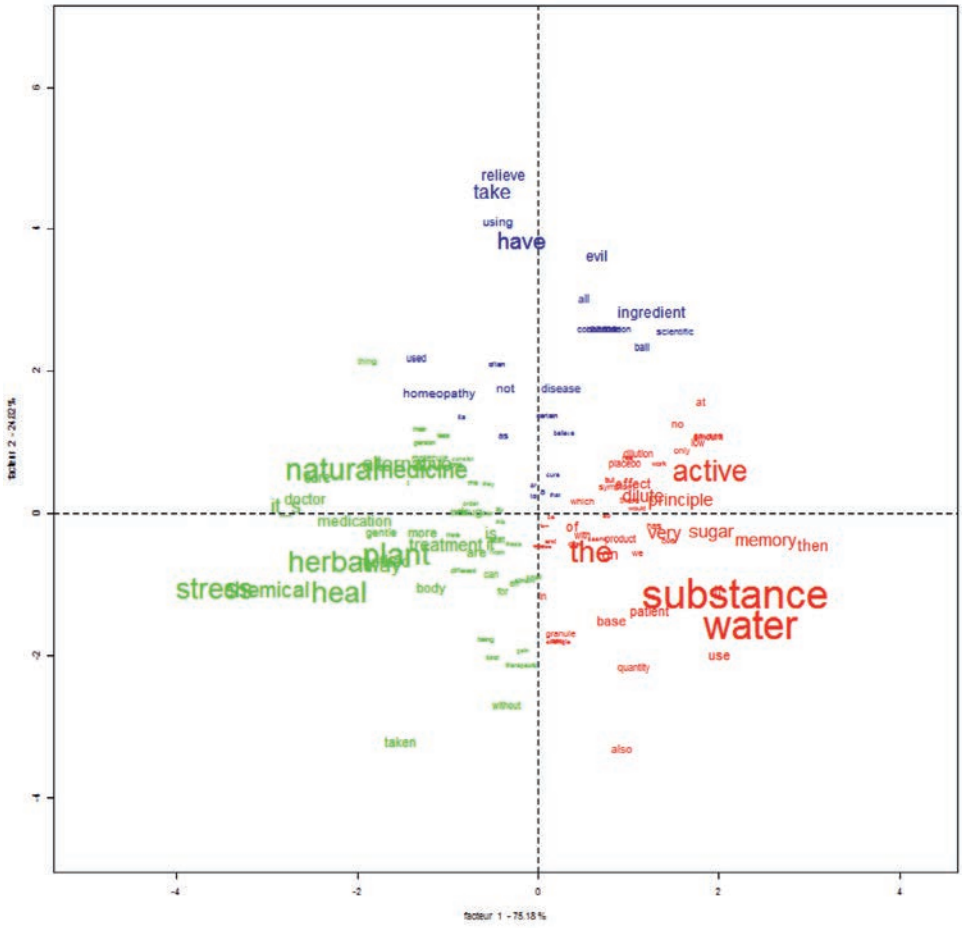

Figure 4. Factor Analysis of Correspondences using IRaMuTeQ-R software: comparison of the three groups of students in Medicine (red, n = 125), Life and earth sciences (blue, n = 75) and Psychology (green, n = 140) – active variables – (adjectives, adverbs, nouns and lemmatized verbs) – coordinates – text size proportional to the Chi-square of association.

of the other two groups is also present in the representation of this group of students. In fact, this population group evaluates homeopathy as an active principle which has been diluted, being able to be a drug or a so-called drug, being an alternative medicine, based on plants, and/or being a substance having a placebo effect. We find both a representation based on plants present in the representation of the group of Psychology students but also an evaluation of a diluted active principle that can be an alternative medicine and/or having a placebo effect found in the representation of the group of Medical students. The representation of the Life and earth sciences students group therefore appears to be partially joint with each of the representations of the other two groups of Medical and Psychology students.

Similarly, if we had been led to compare the individual representations of some Life and earth sciences students and some Medical or Psychology students evaluating homeopathy as natural medicine or as having a placebo effect, it is very likely that we could have found social representations that were totally joint on a case-by-case basis for the same evaluation of homeopathy between these groups, as shown once again by the bringing together of certain points in the clouds.

Conclusion

One of the major challenges of the HOMEOCSS project is to define the central core of the homeopathy representations of different groups. This study, which is part of the OBJ1 of this project and concerning a student audience, allowed us to highlight that the nucleus social representations of homeopathy of three student population groups differ according to their university course. This analysis shows that the representations of the group of Psychology students are opposite to those of the group of Medical students. On the other hand, the representations of the group of Life and earth sciences students seem to be partially combined with those of Medical students and partially joint with those of Psychology students. It is interesting to note that the representations of the group of Psychology students correspond to the representations found in part of the general public (Djouani, OBJ7 publication in progress), that is to say to a representation of homeopathy as "a alternative herbal medicine". The representations of groups of Medical and Life and earth sciences students seem to be closer to the representations found in a large associative public in favor or against homeopathy (Djouani, OBJ7 publication in progress) or found among actors in the academic sphere (Di Scala, OBJ5 publication in progress), that is to say corresponding to a diluted active principle having only the placebo effect or being an effective alternative medicine based on a principle of high dilutions. The study of the groups of students made it possible to highlight within the groups a different evaluation of homeopathy distinguished as "placebo effect" and "alternative medicine" in each of the groups.

An additional analysis would certainly have made it possible to distinguish sub-categories and further refine the classification of these evaluations. However, the objective of this first analysis was to identify in a comparative way between groups the impact of gender and level of training on representations.

It appeared that gender seemed to have an influence. It was found in male students to more likely lead to an evaluation of the "placebo effect" type of homeopathy while it was found in female students more likely to lead to an evaluation of the "alternative medicine" type within the groups of targeted Medical and Life and earth sciences students. However, no gender effect has been demonstrated in Psychology students. These data are in line with existing research data (Leroy, 2014) showing that women (graduates) are more attracted to homeopathy. Our data on the study of the academic sphere (Di Scala, in the course of publication) point to the presence of the register of care ethics in subjects evaluating homeopathy as a gentle and effective medicine, care being concerned with the well-being and caring. It would then be interesting to identify in our case study if the ethical register mobilized by

the students of the different groups falls within an ethical register of care. It is also interesting to note that the gender distribution seems to be more marked for 1st year Medical students and would seem to decrease or even be erased for 2nd year and older Medical students, since in particular 24 girls out of the 38 girls represented over the 2nd and more years, see homeopathy as a placebo effect. These data suggest that the influence of training could offset the gender effect. However, this proposal will remain hypothetical because of the samples size in this study is not sufficient (n <30) to submit them to a Chi-square of homogeneity. However, if this were significant on a larger sample, it would seem to be in agreement with the results in the course of publication of OBJ6 – medical profession (Malpel, in the course of publication) showing an absence of gender effect on representations of the statutory doctors studied.

It also appeared that the level of study within the training seems to influence the representations of students in Medicine since from the second year the representations of students are mainly oriented on an evaluation of homeopathy as having a placebo effect. This influence of the level of study within the formation is not found for the groups of Psychology and Life and earth sciences students.

Proposals of interpretations could lead us to think that the information and scientific knowledge conveyed in the courses of Medicine and Life and earth sciences on the subject of homeopathy lead the students to have a more precise representation of this object. Indeed, some Medical or Life and earth sciences students interviewed indicated having approached this subject in progress for example in the form of lectures. Conversely, Psychology students with little or no information on the subject (none of whom have mentioned having dealt with it), could forge their representations only from extra-university spheres.

Apart from these cases where homeopathy is explicitly mentioned during the courses, one might think that the general scientific lessons offered in the different courses can also have an influence on the representations of students on this subject. It is also possible that the content of the courses specific to the student's baccalaureate has an influence too. All these elements could indeed contribute to the difference in representation between the population groups studied.

Otherwise, in this sense, it is also observed a significant influence of the level of study and training in Medicine for which from the second year the representations of homeopathy correspond mainly to an evaluation of this object as "placebo effect". Indeed, the academic and official discourse on homeopathy (Academy of Medicine, 2019) mentions that this object can only have an action by placebo effect. From a theoretical point of view, representations are indeed the result of different poles (Clément, 2010), knowledge of which is one of them. It therefore seems consistent to identify an influence of training on the representations of students during their course and especially for Medical students. However, knowledge is not the only pole to come into play in the establishment of representations. Practices, ideology and values are other poles that can influence an individual's representations of an object (Clément, 2010). By focusing on Medicine students for whom training seems to significantly influence representations, it is interesting to note that from year 2, cumulatively,

38 students evaluate homeopathy as having a placebo action and 17 students evaluate it as an alternative medicine with its own efficacy. It therefore appears that the contribution of institutional knowledge on the subject is not enough to influence the representations of all students. In a similar way to the analysis carried out on OBJ5 and the academic sphere, it could be proposed that the sociological anchoring of representation has an importance and conditions this latter. Indeed, the analysis relating to the actors of the academic sphere showed that the subjects evaluating homeopathy as an alternative medicine with its own effectiveness, had a post-modern anchoring at different degrees of roots, this anchoring reflecting a critical view of medicine from modernism. It could be proposed that these 17 students have a more post-modern anchor, mainly influencing their representations of this object. It should not be ruled out that some students evaluating homeopathy as a placebo action could have been influenced by the training provided while having a moderate post-modern anchoring. It would then be likely that once their training course is over, they or a part of them could modify their representations of this object. Indeed, the analysis of the speeches of certain doctors from the academic sphere (cf. OBJ5) seems to go in this direction by mentioning a critical vision of current medicine which goes in the direction of a non-recognition of homeopathy. If they had accepted and adopted this vision during their training, some of them were led to revise their judgment as indicated in this extract from an interview conducted with a homeopathic doctor within the framework of OBJ5 (Subject 9 – Annex 2 (Homeopathic doctor)) "I was very disappointed by the fragmented medical approach: no approach to the person. So I wanted to learn acupuncture while studying medicine. My patients talked to me about homeopathy with a lot of testimonials when I did not believe it based on my studies. Then I followed a training in homeopathy and I started in homeopathy by seeing its benefits. Homeopathy has a humanistic approach to the person, a global approach taking into account the person psychologically, sociologically, respecting the person in order to find the most suitable treatment without side effects."

It seems that the sociological anchoring of an individual can preferentially influence his representations. It also seems likely, even if the analysis has not shown it, that an individual may, during his life course, change your sociological anchor. A qualitative interview with these students would help to deepen this aspect.

It would also be interesting to compare the representations of Medical students from different French universities. In fact, the Fakemed collective, stemming from the signatories of the tribune against homeopathy in particular (Collectif, 2018), has established on its site a ranking of universities according to their "porosity" to teachings relating to "non-conventional medicines" within the universities in question (Fakemed, 2020). It appears that the University of Dijon, according to their classification, would be little "porous" (with a score of 3/20) but that a university like Lyon-Sud would be very "porous" (with a score of 20 / 20) in particular with regard to the many diplomas and courses offered on homeopathy and other non-conventional medicines. In the context of our study, a comparative analysis between two groups of medical students from so-called "porous" or slightly "porous" universities, would make it possible to identify the possible influence of his teachings during the training course on representations of the students concerned.

Limits

This study did not allow for a deepened and detail the representations of what the students classified as a "Placebo effect" and a "Medicine without side effects" on the subject of homeopathy. Indeed, it could have been interesting to define subcategories in order to know, in particular, whether the practice of homeopathy depended or not on the initial representation and its evaluation as a placebo effect or not. A sub-categorization could have made it possible to define more precise positioning, however the answers provided by the students did not completely allow this information to be extracted for all of the subjects questioned.

The questionnaire analysis allowed a comparison by group of students according to the different disciplinary courses. An additional individual analysis of students from the different groups studied, in particular by semi-structured or narrative interviews, would have made it possible to identify more precisely the possible common representations.

A comparative analysis between students of the same disciplinary course but coming from different universities could have brought additional elements of reflection to the problematic of this article, in particular vis-a-vis the reflexion relating to the influence of the formations on the representations.

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Comparison of the Representation of Homeopathy from Different Students Audiences

Abstract

Homeopathy is the subject of public controversy that will be characterized as a socio- scientific controversy. Indeed, it has been and still is very controversial within the academic and scientific sphere. Through its history, homeopathy has always oscillated between challenge and integration (Faure, 2002). This study of a student audience is part of the HOMEOCSS societal research project (www.projet-homeoccs.com) which is interested in this controversy and the social representations of homeopathy by various social actors.

This work is based on a comparison of the representations of homeopathy of different student audiences at the University of Dijon, France, and will provide an initial approach to this object of study. The challenge will be to better understand the representations of different student audiences in order to identify whether the training program can have an influence on their representations.

It asks whether the sociological anchoring of an individual can preferentially influence his representations and whether an individual can, during his life course, change a sociological anchoring.

The target audience is composed of students aged between 18 and 25 years old from different university departments: students of Medicine, Psychology and Life and Earth Sciences.

Keywords: homeopathy, controversy, social representation

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