Homeopathy (2012) 101, 103–111

doi:10.1016/j.homp.2012.02.004, available online at http://www.sciencedirect.com

CLINICAL

# Frequently occurring polar symptoms assessed by successful cases

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***Background:*** **Frequently occurring symptoms with opposite poles like 'Cold ameliorates/aggravates' are regarded valuable for homeopathic practice, but are insufficiently assessed and impossible to handle with conventional repertorisation.**
***Method:*** **In a pilot study 30 questions out of a standard questionnaire in 102 cases responding well to five medicines were analysed and compared with a control group of 100 consecutive new cases. Outcomes of a pivot table, Likelihood Ratio (LR) calculations and Multivariate Analysis (MVA) were compared.**
***Results:*** **Some questions were less useful than expected. With an average of 4.8 useful answers per patient and moderate LRs this questionnaire provided substantial information. MVA was useful in emphasising differences between medicines and for differential diagnosis.**
***Conclusion:*** **The value of frequently occurring symptoms could be much enhanced by scientific assessment. We propose further research with an improved questionnaire.** *Homeopathy* (2012) **101**, 103–111.

**Keywords:** Homeopathy; Repertory; Polarity Analysis; Multivariate Analysis; Likelihood Ratio; Questionnaire

## Introduction

Many successful cases in homeopathy are of no use for the development of the homeopathic method because they are never shared with others. Thousands of shared successful cases render misleading information because they are not properly analysed. A symptom seen in a successful case is hitherto regarded an indication for the prescribed medicine, but Bayes' theorem tells us that this is a mistake: the prevalence of the symptom should be higher in the population that responds well to the medicine than in the remainder of the population.[1] Especially everyday symptoms are misinterpreted this way: due to chance every symptom will eventually turn up in a successful case of any medicine. This is demonstrated in the repertory when opposite rubrics are both present (polar symptoms), like symptoms regarding the influence of lying, warmth and motion.[2] Due to chance every medicine will eventually turn up in both opposite rubrics.[3]

An example: suppose we consider the medicines *Bryonia* (*Bry*), *Cocculus* (*Cocc*) and *Nux-vomica* (*Nux-v*) and the patient has the symptoms 'Lying ameliorates', 'Warmth ameliorates' and 'Aversion to motion'. If we consult the repertory (RADAR software, v.10),[4] all three medicines are confirmed, see Table 1. But if we consult the opposite rubrics, *Bry* and *Nux-v* are also confirmed by all the opposite rubrics. In both rubrics 'Warmth ameliorates' and 'Warmth aggravates' *Bry* is represented in the second grade. Does this mean that *Bry* is confirmed both by "Warmth aggravates' and 'Warmth ameliorates'? In that case we expect that in, say, 100 patients responding well to *Bry* 40 patients have an amelioration by warmth, 40 have an aggravation by warmth, and 20 experience no influence from warmth. But it is more likely that, say, 80 patients experience no influence from warmth, 10 have an amelioration by warmth, and 10 have an aggravation by warmth. This frequency distribution is the most likely in most biophysical parameters and (in large samples) represented by the well-known Gauss curve, see Figure 1. We

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Received 12 July 2011; revised 4 February 2012; accepted 9 February 2012

**Table 1** Repertorisation of three symptoms with opposites for three medicines (Kent's repertory, RADAR software)

| | Bry | Cocc | Nux-v |
|---|---|---|---|
| Lying ameliorates | 3 | 1 | 3 |
| Lying aggravates | 2 | 1 | 2 |
| Warmth ameliorates | 2 | 2 | 3 |
| Warmth aggravates | 2 | 1 | 1 |
| Motion, aversion to | 3 | 2 | 3 |
| Motion, desire for | 1 | 0 | 1 |

1 = Plain type; 2 = italics; 3 = bold. There is no fourth grade in these rubrics.

cannot know this for sure because there is no repertory-rubric 'No reaction to warmth' with *Bry* in the third or fourth grade.

Table 2 shows the original repertorisation with 'Lying ameliorates', 'Warmth ameliorates' and 'Aversion to motion' on the left. If we subtract the values of the opposite rubrics from these rubrics − this is called 'Polarity Analysis' (PA) − we get the values at the right side of Table 2. By subtracting the opposite rubric the value for 'Warmth ameliorates' for *Bry* becomes zero, corresponding with the top of the Gaussian curve in Figure 1. In this case we assume that the frequency distribution of reaction to warmth in *Bry* patients is 'normal' (corresponding with the Gauss curve). In other words: the occurrence of cases with opposite symptoms in the same medicine population is due to statistical variance and we should take the median value (zero) of the distribution.

The repertory program of the Boenninghausen Arbeitsgemeinschaft applies PA.[5,6] Three other computer-repertories based on Bönninghausen's therapeutic pocket book have since adopted PA (Boenninghausen module of RADAR,[7] jRep,[8] and Amokoor[9]). PA proved to increase the effectiveness of the first prescription from 28% to 48% in Attention Deficit Hyperactivity Disorder (ADHD) cases[5]. This program shows the opposite rubric automatically and subtracts opposite rubrics from each other, as shown in the right part of Table 3. The outcome, however, is different from the outcome of PA in Kent's repertory. This is probably due to variance in the small samples underlying these repertories. How many doctors contributed to these data (probably only Boenninghausen in his repertory), what does first to fourth grade mean in terms of number of cases and prevalence, etc? Suppose that the information about a symptom concerning a specific medicine is based on five cases, then it makes a big difference if two or three out of five patients had the symptom. The repertories are not based on checking each symptom in each patient and the data are therefore liable to different sorts of bias.

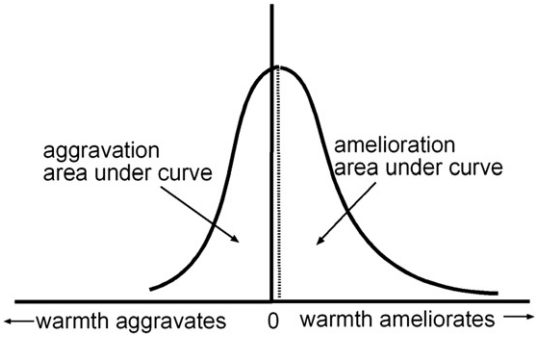


**Figure 1** Hypothetical frequency distribution of the symptom 'Warmth ameliorates/aggravates' for *Bry*.

The interpretation of frequently occurring symptoms should be based on reliable information because they influence the vast majority of our results. Only systematic data gathering and analysis can achieve this. As large amounts of data can be difficult to interpret we should consider statistical techniques. We present a pilot study concerning five homeopathic medicines and 30 (polar) homeopathic symptoms. For the pilot study reported in this paper we retrospectively analysed a set data based on a questionnaire concerning polar symptoms.

## Methods

In this pilot study in one Swiss practice (HF) all patients, supervised by the doctor, filled in a questionnaire in new cases and frequently in new episodes. According to these questionnaires repertorisations were performed using Bönninghausen's therapeutic pocket book with PA. We focused on 30 arbitrarily chosen polar symptoms out of this questionnaire and 5 arbitrarily chosen medicines (*Bry*, *Cocc*, *Crocus* (*Croc*), *Hepar sulfuris* (*Hep*), *Nux-v*). 'Good result' was based on clinical judgement, 102 successful cases responding to these medicines were analysed and 100 consecutive new patients formed a control group. Nearly all successful cases were acute cases, mostly upper respiratory tract infections. The control population also comprised about 15% chronic cases.

Repertorisations of cases that proved successful were sent to the analyst (AR). The outcome was entered in an Excel spread sheet as −1 if the symptom caused aggravation or aversion, as +1 in case of amelioration or desire (resulting in: <cold = −1, >cold = +1), zero if the symptom was not relevant for the patient. The same was done for the control group.

Data were analysed by pivot table, Spearman Rank correlations, Likelihood Ratio (LR) values and by Multivariate Analysis (MVA) (Principal Component Analysis [PCA] and Discriminant Analysis [DA], stepwise method), in this case Fisher Linear Discriminant Analysis (FLDA) using Excel and SPSS19.

The pivot table shows if the average patient responding well to a specific medicine has an amelioration or an aggravation (desire/aversion) and the frequency thereof regarding each variable. By calculating LR values these frequencies are compared with the frequency in the control population. If LR > 1 the symptom is an indication for the corresponding medicine, the indication is stronger as LR is higher.[10] Correlations were measured to investigate if certain pairs of symptoms in the questionnaire were superfluous; two symptoms with high correlation probably express the same influence. PCA tests if there are groups of symptoms larger than two reflecting the same influence.

**Table 2** Repertorisation without and with PA (Kent's repertory)

| | *Conventional repertorisation Kent's repertory* | | | *With PA Kent's repertory* | | |
|---|---|---|---|---|---|---|
| | Bry | Cocc | Nux-v | Bry | Cocc | Nux-v |
| Lying ameliorates | 3 | 1 | 3 | 1 | 0 | 2 |
| Warmth ameliorates | 2 | 2 | 3 | 0 | 1 | 2 |
| Motion, aversion to | 3 | 2 | 3 | 2 | 2 | 2 |

Left the usual repertorisation, right if we subtract the values of the opposite rubrics in Table 1. Then the value for Lying ameliorates for *Bry* becomes 3 – 2 = 1 etc.

DA is a statistical tool to classify different groups by their variables (symptoms).[11] It calculates which combination of symptoms separates maximally the different groups responding well to different medicines. Some symptoms are more important in this respect than others. With stepwise DA only the most discriminating symptoms are selected. The outcome resembles Materia Medica information, where the importance of each symptom is indicated: a higher number for a symptom indicates more importance as an indication for the medicine.

## Results

The questionnaires in the control group produced an average of 4.8 symptoms per patient. The mean prevalence of symptoms in the control group (comparable with the general population) was 8%. On the other hand, some symptoms, like 'change of position', 'closing eyes', 'cold water' and 'noise' contributed little to this response with very few hits in the whole group. Most correlations between symptom-pairs were <0.10, only 4 out of 435 correlations were >0.30, indicating significant overlap of two symptoms. The number of successful cases was: 21 for *Bry*, 20 for *Cocc*, 21 for *Croc*, 20 for *Hep* and 20 for *Nux-v*. Figure 2 regarding the symptom 'cold in general' for *Bry* demonstrates the essence of PA. This is a clear example of a symptom as a chance continuum with a normal distribution and its mean value being close to zero. In this case the medicine is in both opposite rubrics despite the absent relationship between *Bry* and 'Cold'. Only one out of 21 patients had aggravation from cold and three out of 21 had amelioration from cold, 17 had no influence from cold. Because of the relatively low numbers of aggravation and amelioration *Bry* should not be listed as reacting to cold.

Differences between medicines are shown in Table 4 for all five assessed medicines and the control group. This table shows that *Croc* is the only medicine in this group that has aggravation by warmth. The symptom 'exertion of the body aggravates' shows rather large prevalence for all five medicines, but 32% of the control group is also aggravated by exertion. If we follow Bayes' principle that the prevalence of a symptom must be compared with the prevalence in the remainder of the population we understand that the symptom 'exertion aggravates' cannot be a strong indication for any medicine. Even for *Bry*, with a prevalence of 61.9%. For this symptom and *Bry* LR is approximately 62/32 = 1.94. This is an approximation because the prevalence in the general population is not the same as the prevalence in the remainder of the population in Bayes' formula.

Table 4 gives a rough indication of the relationship between symptoms and successful prescriptions. The prognostic value for one symptom can be estimated by comparing the prevalence in the medicine population with the prevalence in the control group, but we have to be careful in translating our data into LR, because of the nature of this assessment: some symptoms recorded prevalence zero because the patient was asked about the two opposites. These are in fact two symptoms. In LR assessment we assess the prevalence of one symptom in the target population (one medicine) and the remainder of the population. In this case the prevalence is mostly not zero. Another caveat is the use of retrospective analysis of cases selected by PA, causing substantive confirmation bias increasing LRs.[12] The LR value can only be used to give an indication of usefulness of symptoms and for comparison between medicines. We must also be aware of the fact that nearly all cases in the target population were acute cases, the control group was a mixture of acute and about 15% chronic cases. The Principal Component that explained most of the variance (9%) was constituted mainly by the symptoms 'Warmth ameliorates', 'Wrapping up

**Table 3** Repertorisation without (left) and with PA (right) in Boenninghausen's repertory (Boenninghausen Arbeitsgemeinschaft)

| | *Conventional repertorisation* | | | *With PA* | | |
|---|---|---|---|---|---|---|
| | Bry | Cocc | Nux-v | Bry | Cocc | Nux-v |
| Lying ameliorates | 4 | 2 | 4 | 2 | 1 | 3 |
| Warmth ameliorates | 2 | 3 | 4 | 1 | 2 | 3 |
| Motion, aversion to | 2 | 3 | 4 | 0 | 3 | 3 |

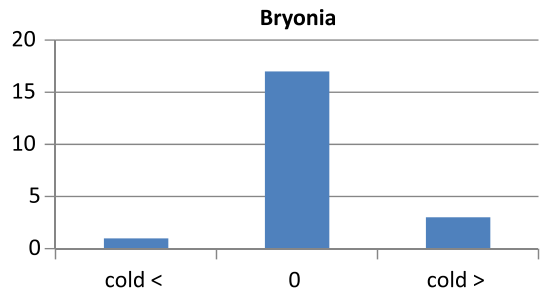


**Figure 2** Frequency distribution of the symptom Cold ameliorates/aggravates in the population responding well to *Bry*.

**Table 4** Frequency of 30 polar symptoms in five populations responding well to *Bry*, *Cocc*, *Croc*, *Hep* and *Nux-v* and a control group

| | *Medicine* | | | | | |
|---|---|---|---|---|---|---|
| *symptoms* | Bry | Cocc | Croc | Hep | Nux-v | *Control* |
| Air, open >/< | 14.3% | −10.0% | 57.1% | −15.0% | −5.0% | 24.0% |
| Air, open, desire/aversion | −19.0% | −5.0% | 61.9% | 0.0% | 0.0% | 14.0% |
| Change of position >< | −4.8% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Closing eyes >< | 0.0% | 0.0% | 0.0% | 0.0% | 5.0% | 0.0% |
| Cold water >< | 4.8% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Cold in genera ><l | 9.5% | −5.0% | 42.9% | −25.0% | −5.0% | −3.0% |
| Draft >< | 0.0% | 0.0% | 0.0% | −10.0% | 0.0% | −2.0% |
| Eating >< | −14.3% | −10.0% | −4.8% | −20.0% | 0.0% | −8.0% |
| Exertion of body >< | −61.9% | −55.0% | −42.9% | −50.0% | −35.0% | −32.0% |
| Lying >< | 71.4% | 30.0% | 33.3% | −50.0% | 65.0% | −14.0% |
| Mildness/irritability | −9.5% | 0.0% | 0.0% | −15.0% | −15.0% | −14.0% |
| Motion >< | −47.6% | −25.0% | −28.6% | −40.0% | −25.0% | −2.0% |
| Motion desire/aversion | −47.6% | −70.0% | −14.3% | 0.0% | −45.0% | −7.0% |
| Muscles stiff/flabby | −38.1% | −55.0% | −33.3% | 0.0% | 0.0% | −3.0% |
| Noise >< | 0.0% | 0.0% | 0.0% | 0.0% | −5.0% | 0.0% |
| Pressure, external >< | −23.8% | 10.0% | 4.8% | −50.0% | −5.0% | −17.0% |
| Rest >< | 61.9% | 35.0% | 66.7% | 55.0% | 75.0% | 9.0% |
| Rising from bed, after | −14.3% | 5.0% | −33.3% | −10.0% | −15.0% | −7.0% |
| Room >< | 0.0% | 0.0% | −14.3% | 10.0% | 10.0% | −3.0% |
| Rubbing >< | 19.0% | 0.0% | 9.5% | 15.0% | 20.0% | 7.0% |
| Shaking head >< | −4.8% | −5.0% | −4.8% | 0.0% | −5.0% | −2.0% |
| Sitting >< | 19.0% | 5.0% | 4.8% | 20.0% | 5.0% | 7.0% |
| Sleep, after, while waking >< | −19.0% | −30.0% | −9.5% | −40.0% | 5.0% | −12.0% |
| Sleep, going to >< | −38.1% | −15.0% | 0.0% | −10.0% | −10.0% | −15.0% |
| Smell hypersensitive/loss | −9.5% | −5.0% | 0.0% | 0.0% | 0.0% | 5.0% |
| Talking >< | −33.3% | −5.0% | −9.5% | −25.0% | −5.0% | −4.0% |
| Thirst/thirstless | 57.1% | −15.0% | 42.9% | 30.0% | 10.0% | 13.0% |
| Uncovering >< | 14.3% | −5.0% | 0.0% | −5.0% | 0.0% | 15.0% |
| Warmly wrapping up >< | 33.3% | 45.0% | −14.3% | 45.0% | 50.0% | 3.0% |
| Warmth in general >< | 33.3% | 40.0% | −38.1% | 45.0% | 65.0% | 8.0% |

The minus sign indicates the symptom has the opposite pole (aggravation or aversion).

warmly ameliorates', and 'Rest ameliorates', which is consistent with acute inflammatory cases: most cases with acute inflammations show this combination of symptoms.

Table 4 gives the mean value of each polar symptom and an indication about the importance of the symptom for the medicine, but LRs should be calculated from one pole of each symptom, as shown in Table 5 for some symptoms in the *Bry*-population.

The rather high LR for 'Talking <' for *Bry* (LR = 8.36) should be taken with caution because the number of patients with the symptom in the control group is low. LRs can also be exaggerated by confirmation bias. The differential diagnosis between the five assessed medicines expressed as LR values is shown in Table 6. LR values between 3.0 and 4.9 are estimated to correspond with grade 2 (italics) in the repertory. LR < 1.5 does not indicate the medicine. LR < 1.0 means that the medicine is contraindicated by the symptom. The outcome of the symptom 'Aversion to motion' contradicts the outcome of PA in Boenninghausen's repertory, but is in agreement with the Materia Medica.

LR values were calculated for all symptoms and medicines. The symptoms 'Change of position', 'Mildness/irritability', 'Noise', 'Sitting', and 'Smell' rendered no useful information. The symptom 'Open air aggravates' indicated *Bry* (LR = 4.8), *Cocc* (LR = 10.0), *Hep* (LR = 15.0) and *Nux-v* (LR = 5.0). This aggravation by open air could also be caused by selection of acute cases. The same might be true for 'Rest >', LRs for this symptom ranged from 1.7 to 3.6.

**Table 5** LR calculations for *Bry* for some symptoms

| | *a* | *c* | *b* | *d* | *LR* | *95% CI* |
|---|---|---|---|---|---|---|
| Exertion < | 13 | 8 | 32 | 68 | 1.94 | 1.25–3.01 |
| Lying > | 15 | 6 | 24 | 76 | 2.97 | 1.91–4.63 |
| Motion < | 10 | 11 | 15 | 85 | 3.18 | 1.66–6.06 |
| Motion, aversion to | 11 | 10 | 15 | 85 | 3.49 | 1.88–6.49 |
| Muscles flabby | 8 | 13 | 7 | 93 | 5.44 | 2.22–13.37 |
| Going to sleep < | 8 | 13 | 14 | 86 | 2.86 | 2.22–13.37 |
| Talking < | 7 | 14 | 4 | 96 | 8.36 | 1.39–5.89 |

a = Population responding well to *bry* with the symptom.
c = Population responding well to *bry* without the symptom.
b = Control group patients with the symptom.
d = Control group patients without the symptom.

## MVA

Table 4 shows what symptoms discriminate between various medicines, but it is difficult to read and impossible to

**Table 6** LR values and their corresponding grades in the repertory

| | *LR* Bry *(grade)* | *LR* Cocc *(grade)* | *LR* Croc *(grade)* | *LR* Hep *(grade)* | *LR* Nux-v *(grade)* |
|---|---|---|---|---|---|
| Lying ameliorates | 3.0 (2) | 2.1 (1) | 2.0 (1) | 0.2 | 2.7 (1) |
| Warmth ameliorates | 2.2 (1) | 2.4 (1) | 0.3 | 2.6 (1) | 3.8 (2) |
| Motion, aversion to | 3.5 (2) | 4.7 (2) | 1.3 (0) | – | 3.0 (2) |

**Table 7** Fisher Linear Discriminant Analysis of symptoms v medicine.

| | *Classification function coefficients* | | | | | |
|---|---|---|---|---|---|---|
| | *Medicine* | | | | | |
| | Bry | Cocc | Croc | Hep | Nux-v | *Control* |
| Air, open >< | 1.208 | −.180 | 2.951 | −.616 | −.299 | 1.444 |
| Air, open, desire/aversion | −1.562 | −.067 | 5.022 | .158 | .608 | 1.101 |
| Cold in general >< | .396 | −.724 | 2.813 | −2.489 | −.156 | −.475 |
| Lying >< | 1.698 | .658 | .219 | −2.022 | .815 | −.339 |
| Motion desire/aversion | −1.732 | −2.825 | −.225 | −.024 | −1.501 | −.316 |
| Muscles stiff/flabby | −3.381 | −4.469 | −2.741 | .287 | −.122 | −.466 |
| Pressure, external >< | −1.158 | .665 | .441 | −2.826 | .173 | −.997 |
| Rest >< | 1.069 | .412 | 2.454 | 2.742 | 1.814 | .411 |
| Sleep, after, while waking >< | −1.538 | −2.360 | −.074 | −3.397 | .020 | −.868 |
| Sleep, going to >< | −4.661 | −1.790 | −.960 | .455 | −1.192 | −1.257 |
| Warmth >< | .475 | 1.390 | −1.134 | 1.159 | 1.974 | .257 |

A positive value means that that patient is ameliorated by or has a desire for the variable, a negative means the opposite.

handle during consultations. What are the most important symptoms? There are statistical methods to calculate what symptoms differentiate best between groups, between respective medicines or between medicines and a control group. We applied FLDA, as shown in Table 7, because it resembles existing procedures in homeopathy. This table can partly be read as a Materia Medica for each medicine, partly as a comparative Materia Medica. Higher values indicate more importance regarding the medicine. The control group has in general lower values, as expected because they are consecutive new cases without known results.

The DA results can also be displayed graphically. For clarity, this is shown only for *Bry*, *Hep* and *control*, see Figure 3. Figure 3 shows that *Bry* has a desire for open air, but this does not discriminate between *Bry* and the 'average' (control) population. For optimal distinction between two medicines or between a medicine and control we look for the largest distances. The difference between *Bry* and *Hep* is best shown by the symptoms 'Cold >< (ameliorates/aggravates)', 'Lying ><', 'Muscles hard/flabby', and 'Going to sleep ><'. The difference between *Hep* and control is best indicated by 'Open air ><', 'Cold ><', 'Rest ><', and 'After sleep ><'.

With the MVA figures we can make comparisons between medicines and between each medicine and the control group. The comparison with the control group resembles the existing Materia Medica. First the comparison with the control group. For *Bry* the DA score for 'Aversion to motion' is 1.732, while LR = 3.49 for the same symptom and medicine. DA scores and LR are not fully comparable, but we can divide these scores, rather arbitrarily, in grade 1 (plain type) if the difference with the control group is between 1.0 and 2.0, grade 2 (italics) if the score is between 2.0 and 3.0, and grade 3 (bold type) if score >3. Based on Table 2 we can enter the following symptoms into the Materia Medica:

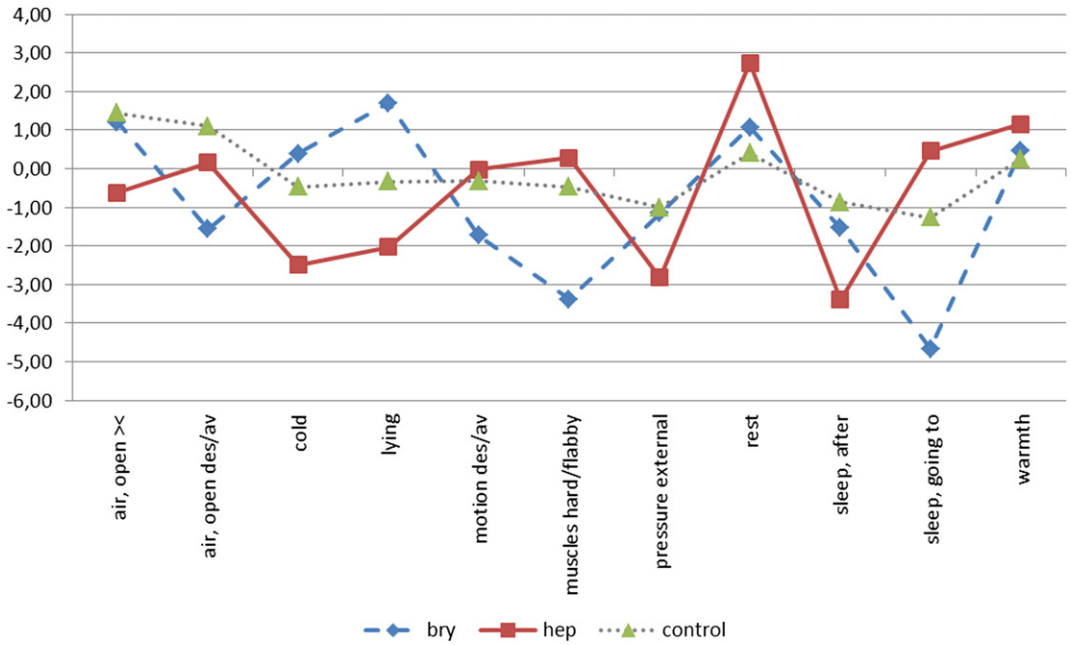


**Figure 3** Graphical presentation of discriminant values for *Bry*, *Hep* and control. For explanation: see text.

*Bry*: *aversion to open air*, lying >, aversion to motion, **muscles flabby**, **going to sleep** <.
*Cocc*: *open air* <, aversion to open air, *aversion to motion*, **muscles flabby**, external pressure >, after sleep while waking <, warmth >.
*Croc*: open air >, **desire for open air**, **cold in general** >, *muscles flabby*, external pressure >, *rest* >, *after sleep while waking* <, *talking* <, *warmth* <.
*Hep*: *open air* <, *cold in general* <, lying <, external pressure <, *rest* >, **talking** <.
*Nux-v*: open air <, lying >, aversion to motion, external pressure>, rest>, warmth >.

By subtracting the values for the same symptom we can differentiate between medicines. Aversion to motion is an indication for *Bry*, but it does not differentiate *Bry* from *Cocc*, because the value of this symptom is even higher for *Cocc*. On the other hand, the symptom 'Warmth in general' differentiates well between *Croc* and *Hep* because it has opposite signs for both medicines; warmth ameliorates in *Hep* and aggravates in *Croc*, the absolute difference is nearly 3. 'Lying ameliorates' is an indication for *Bry* and 'Lying aggravates' is an indication for *Hep*; the difference is 3.7.

The strength of DA is calculating the combinations that maximise the differences between medicines. Table 8 shows that the ordering and differentiation of the medicines in relation to the symptoms of Table 6 improves compared to the LR values. This table also shows that 'Lying ameliorates' has the broadest interval and 'Motion, aversion to' the smallest. DA should be used in combination with other methods. The symptom 'Motion <', a keynote for *Bry*, is not selected by DA, but that does not mean it does not indicate the medicine.

To see how well the DA performs in classifying cases correctly we did DA without control cases and made a confusion matrix (not shown). It is stated that the accuracy of DA should be at least 25% greater than that obtained by chance, in this case 25% + 20% = 45%. Of the cross-validated grouped cases 62.7% were correctly classified, indicating that the DA performs reasonably well to make a first differential diagnosis (Table 8).

**Table 8** Ordering of medicines by weight after DA

| | *1* | *2* | *3* | *4* | *5* |
|---|---|---|---|---|---|
| Lying ameliorates | *Bry* | *Nux-v* | *Cocc* | *Croc* | *Hep* |
| DA values | 1.698 | 0.815 | 0.658 | 0.219 | −2.022 |
| Warmth ameliorates | *Nux-v* | *Cocc* | *Hep* | *Bry* | *Croc* |
| DA values | 1.974 | 1.390 | 1.159 | 0.475 | −1.134 |
| Motion, aversion to | *Cocc* | *Bry* | *Nux-v* | *Croc* | *Hep* |
| DA values | 2.825 | 1.732 | 1.501 | 0.225 | 0.024 |

Negative sign = opposite of mentioned symptom.

## Discussion

Polar symptoms are problematic because according to standard repertories the same medicine is indicated by both opposites of the symptom, like 'Cold aggravates' and 'Cold ameliorates'. In reality only one of the two poles can be an indication for the respective medicine, none of the symptoms we investigated had more patients in both poles and few patients not influenced by the variable. Daily practice confronts us with a high prevalence of polar symptoms that become useless for standard repertorisation. PA can correct for the mistake that repertory-entries are based on absolute occurrence instead of relative occurrence, but the accuracy of the data should be improved by systematic validation to increase the reproducibility of our method.

Analysis of 102 successful cases and 100 controls showed that some symptoms are of little value for a general questionnaire because they have few 'hits', others render low LRs because these symptoms have a high prevalence in the general population. Despite this, the average result of our questionnaire with 30 polar symptoms was five symptoms per patient. Results were analysed by pivot table, LR calculations and MVA, in this case DA. These methods supplement each other: LRs can indicate the importance of individual symptoms for specific medicines, but MVA adds the dimension of extra information by combining symptoms and maximising the distance between medicines by optimal weighing of symptoms. DA provides both a standard Materia Medica and a comparative Materia Medica. Stepwise Fisher Linear Discriminant Analysis (SFLDA) shows that a limited number of common symptoms from a questionnaire can give a fair differential diagnosis to start the consultation with. SFLDA accentuated the differences between medicines.

Former LR assessment showed that LRs of keynote symptoms seldom exceed 6.[13] LRs of these frequently occurring symptoms are lower, but the average result of five symptoms per patient renders an interesting first impression of the patient. Five symptoms with, say, LR = 2 result in a combined LR = $2^5$ =32. Three keynote symptoms with LR = 6 result in a combined LR = 216. Five symptoms with LR = 2 plus one keynote with LR = 6 render a combined LR = 32 * 6 = 186. This indicates that the questionnaire we investigated could improve our results in cases with few good symptoms, because five symptoms from the questionnaire nearly equal two keynote symptoms.

Some symptoms were interesting because they indicated only one medicine (out of five): 'Open air ameliorates' only indicates *Croc* (LR = 2.3), 'Closing eyes <' for *Nux-v* (LR = 5.0), 'Draft <' for *Hep* (LR = 5) and 'Eating <' for *Hep*. As stated before, LRs could be exaggerated by confirmation bias.

This pilot study is an exploration of the possibilities modern statistical techniques can offer in our highly experience-based method. FLDA is just one of the many techniques in MVA that could be applied in homeopathy. It is possible to map all relationships between medicines and symptoms and show the respective distances between medicines. The value of MVA for homeopathy should be further explored.

Our research suffers from confirmation bias because the medicines were chosen on repertorisations with PA. But our findings suggest that also repertories applying PA can be improved. By selecting best cases and comparing these cases with a control group we can validate and improve our existing data. Repeating the same procedure with improved data we get a step-by-step improving quality circle. By systematic collection of data by questionnaires by a large

number of practitioners homeopathy can become a data driven method with steadily improving repertories.

We must realise that improving the data in our Materia Medica and repertories does not cover the principal shortcoming of repertorisation: the choice of the homeopathic medicine depends on a highly complex procedure and repertorisation is just a rough indication. Compare this with a weather forecast: what you are going to do tomorrow depends on more than the weather forecast, but you like the weather forecast to be accurate. Our repertories can be considerably improved, but that does not change our method.

Our research should be followed by prospective research with such a questionnaire in a variety of practices (also not applying repertories with PA). The most promising research questions for MVA seem:

1 discriminating between the medicines we most frequently use;
2 discriminating between medicines we use for indications where efficacy should be further investigated, like upper respiratory tract infection.

To standardise and to modernise the questionnaire Likert scales could be applied. The Appendix shows a questionnaire based on our results investigating frequently occurring polar symptoms. Similar questionnaires can be developed for other polar symptoms like food symptoms.

## Conclusion

A pilot study assessing frequently occurring symptoms with opposite values like 'Cold ameliorates/aggravates' showed that the reliability of these symptoms could be considerably improved. Specific combinations out of 30 polar symptoms enable us to discriminate between different medicines and these medicines can also be separated from the 'average'.

We recommend further research with questionnaires regarding frequently occurring symptoms.

## Competing interests

No competing interests.

## Funding

No funding.

## Appendix

**Homeopathic questionnaire**

Please mark (X) how you feel or how you are influenced by all factors below. So if you feel better, mark this as follows:

| Much better | | Neutral | | Much worse |
|---|---|---|---|---|
| [ ] | [X] | [ ] | [ ] | [ ] |

**Most important are changes caused by your illness.**

**1. Complaints are in the open air**

| Much better | | Neutral | | Much worse |
|---|---|---|---|---|
| [ ] | [ ] | [ ] | [ ] | [ ] |

**2. Influence of cold in general**

| Much better | | Neutral | | Much worse |
|---|---|---|---|---|
| [ ] | [ ] | [ ] | [ ] | [ ] |

**3. Influence of wet weather**

| Much better | | Neutral | | Much worse |
|---|---|---|---|---|
| [ ] | [ ] | [ ] | [ ] | [ ] |

**4. Influence of dry weather**

| Much better | | Neutral | | Much worse |
|---|---|---|---|---|
| [ ] | [ ] | [ ] | [ ] | [ ] |

**5. Influence of becoming cold**

| Much better | | Neutral | | Much worse |
|---|---|---|---|---|
| [ ] | [ ] | [ ] | [ ] | [ ] |

**6. Influence of a warm room**

| Much better | | Neutral | | Much worse |
|---|---|---|---|---|
| [ ] | [ ] | [ ] | [ ] | [ ] |

**7. Influence of sun**

| Much better | | Neutral | | Much worse |
|---|---|---|---|---|
| [ ] | [ ] | [ ] | [ ] | [ ] |

**8. Desire/aversion open air**

| Strong desire | | Neutral | | Strong aversion |
|---|---|---|---|---|
| [ ] | [ ] | [ ] | [ ] | [ ] |

**9. Influence of uncovering**

| Much better | | Neutral | | Much worse |
|---|---|---|---|---|
| [ ] | [ ] | [ ] | [ ] | [ ] |

**10. Influence of drinking (any liquid)**

| Much better | | Neutral | | Much worse |
|---|---|---|---|---|
| [ ] | [ ] | [ ] | [ ] | [ ] |

**11. Thirst**

| Much | | Neutral | | None |
|---|---|---|---|---|
| [ ] | [ ] | [ ] | [ ] | [ ] |

**12. Influence of eating**

| Much better | | Neutral | | Much worse |
|---|---|---|---|---|
| [ ] | [ ] | [ ] | [ ] | [ ] |

**13. Hunger**

| Much | | Neutral | | None |
|---|---|---|---|---|
| [ ] | [ ] | [ ] | [ ] | [ ] |

**14. Warm or cold food**

| Prefer warm | | Neutral | | Prefer cold |
|---|---|---|---|---|
| [ ] | [ ] | [ ] | [ ] | [ ] |

**15. Influence of motion**

| Much better | | Neutral | | Much worse |
|---|---|---|---|---|
| [ ] | [ ] | [ ] | [ ] | [ ] |

**16. Influence of sitting bent**

| Much better | | Neutral | | Much worse |
|---|---|---|---|---|
| [ ] | [ ] | [ ] | [ ] | [ ] |

**17. Influence of walking**

| Much better | | Neutral | | Much worse |
|---|---|---|---|---|
| [ ] | [ ] | [ ] | [ ] | [ ] |

**18. Influence of standing**

| Much better | | Neutral | | Much worse |
|---|---|---|---|---|
| [ ] | [ ] | [ ] | [ ] | [ ] |

**19. Influence of sitting**

| Much better | | Neutral | | Much worse |
|---|---|---|---|---|
| [ ] | [ ] | [ ] | [ ] | [ ] |

**20. Desire/aversion to move**

| Strong desire | | Neutral | | Strong aversion |
|---|---|---|---|---|
| [ ] | [ ] | [ ] | [ ] | [ ] |

**21. Influence of lying**

| Much better | | Neutral | | Much worse |
|---|---|---|---|---|
| [ ] | [ ] | [ ] | [ ] | [ ] |

**22. Influence of rest**

| Much better | | Neutral | | Much worse |
|---|---|---|---|---|
| [ ] | [ ] | [ ] | [ ] | [ ] |

**23. Influence of external pressure**

| Much better | | Neutral | | Much worse |
|---|---|---|---|---|
| [ ] | [ ] | [ ] | [ ] | [ ] |

**24. Influence of touch**

| Much better | | Neutral | | Much worse |
|---|---|---|---|---|
| [ ] | [ ] | [ ] | [ ] | [ ] |

**25. Influence of rubbing/massage**

| Much better | | Neutral | | Much worse |
|---|---|---|---|---|
| [ ] | [ ] | [ ] | [ ] | [ ] |

**26. Influence of mental exertion**

| Much better | | Neutral | | Much worse |
|---|---|---|---|---|
| [ ] | [ ] | [ ] | [ ] | [ ] |

**27. Influence of talking**

| Much better | | Neutral | | Much worse |
|---|---|---|---|---|
| [ ] | [ ] | [ ] | [ ] | [ ] |

**28. Sensitivity to light**

| Much | | Neutral | | None |
|---|---|---|---|---|
| [ ] | [ ] | [ ] | [ ] | [ ] |

**29. In the dark**

| Much better | | Neutral | | Much worse |
|---|---|---|---|---|
| [ ] | [ ] | [ ] | [ ] | [ ] |

**30. Sensitivity of smell**

| Much | | Neutral | | None |
|---|---|---|---|---|
| [ ] | [ ] | [ ] | [ ] | [ ] |

**31. Going to sleep**

| Much better | | Neutral | | Much worse |
|---|---|---|---|---|
| [ ] | [ ] | [ ] | [ ] | [ ] |

**32. Waking after sleep**

| Much better | | Neutral | | Much worse |
|---|---|---|---|---|
| [ ] | [ ] | [ ] | [ ] | [ ] |

**33. After rising from bed**

| Much better | | Neutral | | Much worse |
|---|---|---|---|---|
| [ ] | [ ] | [ ] | [ ] | [ ] |

**34. Influence of sleep**

| Much better | | Neutral | | Much worse |
|---|---|---|---|---|
| [ ] | [ ] | [ ] | [ ] | [ ] |

**35. Influence of lying on painful side**

| Much better | | Neutral | | Much worse |
|---|---|---|---|---|
| [ ] | [ ] | [ ] | [ ] | [ ] |

**36. Influence of stooping**

| Much better | | Neutral | | Much worse |
|---|---|---|---|---|
| [ ] | [ ] | [ ] | [ ] | [ ] |

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