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Training the clinical eye and mind: using the arts to develop medical students' observational and pattern recognition skills

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INTRODUCTION Observation, including identification of key pieces of data, pattern recognition, and interpretation of significance and meaning, is a key element in medical decision making. Clinical observation is taught primarily through preceptor modeling during the all-important clinical years. No single method exists for communicating these skills, and medical educators have periodically experimented with using arts-based training to hone observational acuity. The purpose of this qualitative study was to better understand the similarities and differences between arts-based and clinical teaching approaches to convey observation and pattern recognition skills.

METHOD A total of 38 Year 3 students participated in either small group training with clinical photographs and paper cases (group 1), or small group training using art plus dance (group 2), both consisting of 3 2-hour sessions over a 6-month period.

FINDINGS Students in both conditions found value in the training they received and, by both self- and instructor-report, appeared to hone observation skills and improve pattern recognition. The clinically based condition appeared to have been particularly successful in conveying pattern recognition concepts to students, probably because patterns presented in this condition had specific correspondence with actual clinical situations, whereas patterns in art could not be generalised so easily to patients. In the

arts-based conditions, students also developed skills in emotional recognition, cultivation of empathy, identification of story and narrative, and awareness of multiple perspectives.

CONCLUSION The interventions studied were naturally complementary and, taken together, can bring greater texture to the process of teaching clinical medicine by helping us see a more complete 'picture' of the patient.

KEYWORDS students, medical/ *psychology; humans; clinical competence/ *standards; *art; teaching/ *methods; education, medical, undergraduate/ *methods; pattern recognition, visual.

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INTRODUCTION

Clinical observation, including identification of key pieces of data, recognition of patterns in the data gathered, and interpretation and reinterpretation of both data and patterns, is a key component of medical decision making, the complex process by which clinicians gather data, arrive at conclusions, and decide upon management.¹ Although no single generally accepted model of medical decision making exists, there is general agreement that the process begins with observation. For example, Chang *et al.* have suggested in a preliminary study that doctors or students who are able to identify key factors most efficiently in clinical cases are most likely to arrive at an accurate diagnosis.²

In the language of art, observation is referred to as 'seeing'. Theories of seeing conclude that 'no matter

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Overview

What is already known on this subject

Existing studies and curriculum reports of the impact of visual arts training as a pedagogical tool in medical education suggest that such training improves both observational and empathic skills in medical students and may be superior to standard teaching.

What this study adds

This qualitative analysis of clinical and arts-based instructional methods found that both methods were effective in teaching observational and pattern recognition skills. Traditional methods conveyed more depth regarding the latter construct, while arts-based teaching added insights about relationship, narrative and empathy.

Suggestions for further research

Future research might incorporate quantitative methods and measures that could build on insights from qualitative findings such as those reported here.

how hard we look, we see very little of what we look at'.³ (p 11) We miss things despite looking directly at them, or fixate on certain pieces of data to the exclusion of other pertinent sources of information. Disturbing as it may seem from a scientific standpoint, seeing is not objective. Therefore, experts conclude that to 'break through the wall of usual seeing'³ (p 56) requires developing a way of seeing that is 'flexible, liquid'.³ (p 41)

Training the clinical eye

What is the best way to train seeing in medical education? In an unusual approach that replicated and extended an earlier study,⁴ Dolev *et al.* postulated that systematic observation of figurative paintings could enhance medical students' observational skills.⁵ The investigators were able to show that students trained in this manner were more likely to accurately and fully describe clinical photographs of patients with medical conditions that had clearly

observable manifestations than were students who participated only in the standard curriculum. A similar project using qualitative observations and feedback from learners concluded that students who studied figurative art improved their observational skills and increased their awareness of emotion and character as revealed in facial expressions.⁶

Training the clinical mind

This study used a qualitative design to investigate what medical students learned about observation and pattern recognition by participating in either clinically based or arts-based teaching sessions. We were interested in ascertaining whether, from the perspective of learners and instructors, these 2 disparate pedagogical processes conveyed similar or different information and skills.

METHODS

Participants

All students in the graduating class of 2006 ($n = 92$) entering their third (clinical) year of medical school were invited to participate in a study on the training of observational and diagnostic skills.

Design and procedures

A total of 38 students consented to participate. They were initially divided into 3 groups. Group 1 ($n = 15$) was provided with training using clinical photographs and cases. (Appendix 1 lists the photographs and cases used.) Group 2 ($n = 11$) was given training using art and group 3 ($n = 14$) received training using a mixed media format of art and dance. (Appendix 2 lists the art and dance materials used.) This latter group was added to explore the possibility that combining dance with art would bring temporal and spatial dimensions to the training that might differentially affect study outcomes.

In contrast to previous research, both representational and non-representational art was used in the study. Representational art provided a useful starting point because students could easily recognise figures, shapes and context in these paintings, thus simplifying the identification of specific details and trends. However, non-representational art was a useful supplement precisely because it forced students to observe and look for patterns (such as presence or absence of symmetry, precise colours and shapes,

themes with variants, or relationships) without any familiar frame of reference.

The teaching for all 3 conditions consisted of 3 small group sessions, of 2 hours each, conducted over a 6-month period. The arts-based sessions were conducted by a faculty member from the University of California, Irvine, School of the Arts, and the clinically based sessions by a faculty member from the School of Medicine. The 2 instructors were both considered excellent teachers, and had similar enthusiastic, knowledgeable and learner-centred teaching styles. The instructors used similar pedagogical approaches, which grew out of conversations that analysed correlations between observing art and observing patients. The parallelisms noted led to the development of a teaching method rooted in visual anthropology techniques⁷ that recognised the constructed nature of seeing and emphasised an instructional process of recurrent seeing, followed by reflection on the discipline of cyclical observation and analysis, ultimately resulting in informed insights and defensible judgements. In both instructional conditions, the meta-context was to help students see things as they are, in all their uniqueness, rather than simply the *idea* of things.^{8,9}

The range of artwork used in this study was chosen in order to exercise this methodology to the fullest extent possible. To train observational skills, we looked at less accessible artwork (i.e. artwork that is more difficult to characterise and less replete with familiar forms or content, such as non-representational art). To necessitate reflection, we looked at paintings with hidden meanings¹⁰ or paintings that were outside these students' aesthetic preferences, such as surreal art. By exposing students to many genres of art, the instructor hoped they would develop a systematic process of observation that they could apply to highly divergent stimuli.

Data collection and analysis

Several sources of qualitative data were obtained, including post-session group interview comments from students (Appendix 3 shows the question route), written feedback from students, participant observations, and instructor debriefings. The multiple sources allowed for data triangulation. We also had theoretical triangulation in that data were examined by researchers from diverse academic backgrounds: psychology, medicine, the arts and educational research. We judged our data to have achieved theoretical saturation because, by the final sessions, we detected significant repetition of key

words and categories. As in most qualitative studies, data collection and interpretation occurred simultaneously as the study progressed. After each session, both qualitatively trained observers compared written notes and discussed points of agreement and difference in their conclusions. At least 1 qualitative observer also debriefed with each instructor after each session. Student feedback was also discussed with the other researchers on a regular basis.

Upon completion of the teaching phase of the project, all notes, observations and summaries of student and instructor debriefings were compiled and reviewed by the 2 qualitative researchers, using a content analysis approach, in which key words and constructs were identified. The first author then singled out major concepts, which were circulated among all researchers, who provided commentary, revisions and amendments in an iterative process.

RESULTS

Our examination of the qualitative data was organised around analysing similarities and differences in the concepts that emerged during the clinical and arts-based sessions. As no consistent differences appeared between the arts-only and arts/dance conditions, these 2 groups were combined, and will subsequently be referred to as group 2.

The clinical sessions (group 1) were characterised by an evolutionary process from simple to more complex understanding. The first session emphasised refining observational skills. The second focused on making decisions about patients, with emphasis placed on developing pattern recognition, or learning how to identify key factors in a clinical photograph or case study that fit together (e.g. ear pain, nasal congestion and fever in a 6-month-old infant might represent a 'pattern' indicating otitis media). Students looked at a series of clinical pictures, systematically identified details, and then summarised the pattern. The instructor highlighted the importance of not jumping too quickly to a diagnosis, as well as focusing on details and then reintegrating them into the big picture. The final session concentrated on refinement of the model by introducing the concept of justification, in terms of learning to reduce key factors, be more discriminating, and recognise what was pertinent. Students no longer simply focused on observed details, but on learning to justify the importance of some details over others. Finally, this session introduced the concept of 'retelling the (clinical) story' once key elements and

patterns were identified, to see if it could be seen differently and more effectively.

Students liked these sessions and particularly noted new knowledge they acquired about certain diagnoses, as well as identifying actual clinical patterns. The main concepts these students reported learning were observational skills, pattern recognition, and, through the development of these skills, better ways of approaching and organising differential diagnosis. Several students noted the value of learning to practise a particular thought process. When asked for an example of how they had applied this training in clinical settings, several students reported becoming more aware of patterns in patients. A few students had difficulty working with the model, including mistakenly identifying patterns or only recognising patterns retrospectively. The debriefing of the clinical instructor essentially confirmed these conclusions.

The arts and arts/dance groups included many points pertinent to refining observational skills and developing pattern recognition, but also introduced other concepts relating more to the doctor–patient relationship generally than to medical decision making. These concepts are discussed below.

Deep seeing

Deep seeing was the arts-based equivalent of refining observational skills, but was developed in a broader manner. Deep seeing involved not only the repeated careful observation stressed in the clinical group, but also learning to see beyond the expected, in patients as well as in pictures (*The Melancholy of Departure*, de Chirico). A variation of this idea concerns the importance of not missing things other than where the eye is initially drawn, or, in the words of the instructor, of seeing ‘what is going on in the shadows’ (*The Railroad Bridge*, Monet), a concept with clear relevance for understanding the subtleties of patients’ reactions to illness. Deep seeing also encompassed the idea of reflecting upon and then revisiting first impressions to ensure important elements are not overlooked (*Voice of Space*, Magritte). In sum, ‘seeing’ became defined not only literally, but as a metaphoric and symbolic process of connection involving insight and the determination of significance.

Pattern recognition

Similar to the clinical sessions, the arts-based sessions regularly explored identifying patterns in paintings and dance (*Points in Space*, Cunningham and Cage).

Students learned that when they observe 2 different things, they should try to establish a relationship between them by noting similarities and differences in details and composition (*Disquieting Muses*, de Chirico). The sessions also suggested the importance of refining the pattern by distinguishing between which elements of the painting were essential and which were peripheral (*Vase with Flowers and Pocket Watch*, Aelst), a process of discrimination similar to the clinical sessions’ identification of key factors. Arts-based sessions also explored the relationship of details to the big picture (another group 1 concept) by practising breaking down what is seen into component parts, then reconstituting the parts into a (better understood) whole. Whereas the ‘meaning’ of pattern recognition in the clinical sessions led directly to differential diagnosis, in the arts-based sessions, the ‘meaning’ conveyed by patterns was much more far-reaching. While including structural and colour repetition (*Composition VIII*, Kandinsky), it also emphasised patterns in emotions (*Descent from the Cross*, Rembrandt), facial expressions (*Five Grotesque Faces*, da Vinci), relationships (*Old Man with Young Boy*, Ghirlandaio), and narratives (*Absinthe Drinker*, Picasso).

Awareness of emotional responses in self and others

Another important concept in the arts-based sessions was student awareness of their feelings of uneasiness, nervousness, discomfort or anxiety in response to the unexpected or the non-normative in both dance and art. Non-traditional dance evoked snickers, puzzlement and a ‘nervous’ response (*Points in Space*, Cunningham and Cage). Similarly, students laughed at a Jackson Pollock painting, describing it as ‘splatter’ (*Number 20*, Pollock). These responses seemed triggered by violations of students’ expectations regarding what a dance or a painting ‘ought to’ look like. By contrast, paintings with narrative aspects, realism, symmetry, balance and harmony appealed to many students (*Luncheon of the Boating Party*, Renoir).

The arts instructor deliberately showed what she described as ‘less aesthetically pleasing’ pictures with the intention of jolting students into paying closer attention to their automatic emotional responses to certain stimuli (*The Ugly Duchess*, Metsys). Students explored which aspects of these paintings triggered aversion, and how close observation of certain features in these artworks could stimulate more appreciative, valuing responses. The contextual message was that just as students had unexamined, judgmental reactions of aversion and dislike to certain paintings, they could also have similar

reactions to actual patients, resulting in problematic diagnostic and/or treatment consequences.

The arts-based sessions also helped students distinguish various emotions expressed in paintings and dance. Students practised identifying a range of emotions and also worked at refining recognition of nuances in emotional reactions (*Six Figure Studies*, da Vinci). The overall point was that careful observation could reveal much about an individual's (or patient's) emotional state as well as their pathological condition.

Attention to relationships and story

In various dance and art examples, the instructor directed students' attention to the relationships and emotional connections among the characters (*Outside-In*, Marks; *The Loge*, Renoir). The ways in which specific examples of art (primarily representational) and dance could convey a story were emphasised. Students were specifically encouraged to ask: What story does the painting tell (*Christ Healing the Blind*, El Greco)? Who are the characters and how are they connected (*Desdemona Cursed by her Father*, Delacroix)? Students learned that there might be more than 1 story told in any given painting (*Two Little Circus Girls*, Renoir), and were then able to draw a parallel between appreciation for the stories found in art and the importance of the personal story in which the patient is embedded.

Questioning assumptions; allowing for multiple interpretations

Questioning assumptions was a key concept introduced in the arts-based groups. For example, a discussion of Vincent van Gogh's *Blue Cart* led to the insight that we need imaginative flexibility to rethink what we've decided is important based on additional information. Different dance videos challenged assumptions about what dance is or is not, and who is a dancer (*Mr Chris the Music Man*, Lancaster). These sessions regularly called attention to the possibility that different interpretations could be derived from the same evidence, a concept similar to the clinical group's concept of retelling the story. Further, because there are multiple ways of determining the major focus, justification (also stressed in the clinical group) is crucial when multiple interpretations are possible.

In general, students expressed enjoyment of these sessions, although some wished they had received training using clinical photographs as well, while others suggested faculty and residents be trained in a

similar manner. Students stated they had improved their observational skills as a result of this training. While students in arts-based groups noted developing skills in pattern recognition, they did not discuss this concept as extensively as those in the clinically based debriefing groups, and seemed more tentative about what they had learned. Students felt they had developed a systematic, coherent method of seeing. Over half of the students specifically commented that the sessions increased empathy by helping them to reconnect with their own feelings, improving their ability to consider others' points of view and avoid preconceived notions, and teaching them to go beyond first impressions and look deeper. The arts instructor generally agreed with student evaluations, although she believed their improvement in pattern recognition had also been considerable.

CONCLUSIONS

Our data analysis was illuminating in terms of both the similarities and differences that emerged between groups 1 and 2. Both approaches provided effective training in observational skills, pattern recognition and a coherent method of analysis, and also covered similar concepts such as the relationship of details to the big picture, justification and retelling the story. However, the clinically based training appeared to have been more successful in conveying multiple dimensions of pattern recognition. We are unsure exactly why this was the case, but speculate that it may be due to the fact that, in the clinical group, there was a specific correspondence between the clinical patterns presented and diseases students encountered, while in the arts-based group students had to generalise between fields. Further, the clinical sessions included significant elements of differential diagnosis as a logical extension of the teaching, which showed students the value of the skills of observation and pattern recognition, but a topic that was never mentioned in the arts-based sessions.

On the other hand, in contrast to the clinical sessions, the arts-based sessions tended to approach observation and pattern recognition not only literally, but metaphorically and symbolically as well. In these groups, seeing was defined not only as observation of physical signs and features, but also as a process of understanding person and context. Similarly, pattern recognition included both structural and 'human' aspects. In group 1 sessions, the 'meaning' of patterns pointed to clinical schema and differential diagnosis. In the arts-based conditions, 'meaning' had more to do with understanding the human condition.

Finally, although the concept of story was mentioned occasionally in the clinical sessions, it was much more central to the arts-based sessions. In the clinical sessions, it was rare for students or instructor to speculate on the human being behind the clinical photographs or vignettes. By contrast, the arts-based sessions routinely addressed narrative in both representational paintings and dance, and sensitised students to its importance. While in the clinical sessions, story was seen in the service of the diagnosis, in the arts-based sessions it became an irreducible attribute of the patient. Thus, the clinically based teaching appeared to be an effective way to teach about disease, while the arts-based method was a useful way to teach about illness.

Several parallels between art and medicine^{11,12} emerged from our data analysis, including the importance of learning how to read gesture and expression, how to interpret context, how to determine what is symbolically as well as literally important, how to be sceptical about initial assumptions, and finally, how to empathically perceive emotional dimensions and narrative. These similarities reinforce our conclusion that the 2 teaching approaches studied were naturally complementary, and justify the growing inclusion of arts-based pedagogical tools and approaches in medical education.¹³ Taken together, training employing a wide range of methods can bring greater texture to the process of teaching clinical medicine and help us see a more complete picture of the patient.

Contributors: All authors made substantial contributions to the conceptualisation and design of the study. LR and JB, respectively, developed and implemented the educational interventions for the standard and experimental conditions of the study. JS designed the qualitative measures and was the primary analyst of the qualitative data. LR and JB contributed to analysis and interpretation of the data. JS was responsible for the original draft of the manuscript. LR and JB revised the manuscript and contributed multiple theoretical and content additions.

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Conflicts of interest: None.

Ethical approval: The study was approved by the University of California, Irvine Institutional Review Board for Human Subjects.

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SUPPLEMENTARY MATERIAL

The following supplementary material is available for this article online:

Appendix S1. Photographs and/or cases used in the clinical teaching sessions.

Appendix S2. Video and arts materials used in the arts-based teaching sessions.

Appendix S3. Question route used to debrief students after each teaching session.

This material is available as part of the online article from <http://www.blackwell-synergy.com>

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