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ORIGINAL RESEARCH

Peer-assisted learning in medical school: tutees' perspective

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Purpose: Peer tutoring offers a valuable method of enhancing students' learning experience in medical school. Junior students learn from senior peers to reinforce curriculum content in an engaging community environment. The aim of our study was to assess tutees' perceptions of a formal peer tutoring program at the Central Clinical School of Sydney Medical School. We used the learning theory of the community of practice in order to understand tutees' perspectives.

Patients and methods: All Year 1 and Year 2 students within the Central Clinical School were invited to be tutored by Year 3 and Year 4 students, respectively. Tutor pairs taught a group of three to four tutees fortnightly, and the tutorials were largely clinically based. A questionnaire containing 13 closed items and four open-ended questions regarding their experiences in the program was distributed to the tutees. Descriptive statistics were used to analyze the data.

Results: A total of 66 of 101 (65%) Year 1 and Year 2 students took part as tutees and 42 of 106 (40%) students as tutors. The tutees' response rate was 53% (35/66). Results were largely positive, with 97% of the tutees enjoying the program, 90% showing interest in tutorial topics, 91% feeling a sense of community, 100% wanting to take part next year, 97% finding small groups effective, and 97% and 91% feeling an improved understanding of medical concepts and clinical skills, respectively. Tutees perceived the most useful aspects to be learning and revision and advice from experienced peers. The most frequent suggestion for improvement was to resolve scheduling conflicts.

Conclusion: Tutees found the peer tutoring program to be valuable in learning and revision, establishing a community, and gaining practical skills and advice through a small-group format. The community of practice framework was useful in identifying these areas of benefit, demonstrating that a peer tutoring program such as this can provide an enhanced learning environment for tutees.

Keywords: peer tutoring, community of practice, student teaching

Introduction

Peer tutoring offers a valuable method to enhance the learning experience in medical school.[1–4] For students who receive the tutoring (tutees), this form of education delivery has the potential to provide benefits on multiple levels. It can assist in rectifying areas of weakness in knowledge and competencies, provide a safe space for practice and reinforcement of curriculum content, and foster a sense of community among junior and senior peers.[2,5]

Peer tutoring is acknowledged as a way of engaging students beyond a superficial level.[2] This "deep" approach to teaching and learning is largely due to the aim of peer tutoring, that is, to be supplementary to, rather than separate from, existing teaching.[6] The approach is further facilitated by its ability to be more interactive,[7] more targeted

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toward specified areas of interest or weakness,[8] and less authoritative[9] than traditional teaching. What strengthens these aspects of the teaching process is the greater understanding that senior peers have of the learning needs and capabilities of junior students, as well as the curriculum and assessment requirements, compared to highly trained and experienced senior consultants. This proximity in experience defines the valuable social and cognitive congruence that senior students offer. This may contribute not only to students' appreciation of being taught by peers[10] but also to the volume and depth of learning possible by a student when provided with appropriate instruction, as indicated by Vygotsky's Zone of Proximal Development.[11]

Theories of learning can provide a valuable lens to analyze educational practices. The framework of community of practice (CoP), a theory of learning proposed by Lave and Wenger,[12] was used to structure and focus the current study. This theory posits that a CoP is established when individuals work together on a common activity, creating a "shared identity" through participation and regular interaction. Three concepts are essential to define a CoP:[13]

1. Domain – an activity or interest that is shared by its members who express a commitment to pursuing this domain.
2. Community – the characteristics of a group of people willfully interacting with and helping one another to share ideas or knowledge.
3. Practice – the resources, experiences, and methods developed for and through engagement with the domain – the "shared repertoire".

These three characteristics are combined and developed simultaneously in an authentic CoP.

In 2014, we instituted a formal peer tutoring program at the Central Clinical School (CCS) of Sydney Medical School, where junior students new to the hospital were tutored by senior peers. This was known as the peer-assisted learning scheme. The aim of our study was to explore tutees' experiences of the program, using CoP as a framework to understand students' insights and perspectives.

Materials and methods

Participants

All junior students within the CCS, consisting of Year 1 students (n=50) and Year 2 students (n=51), were invited to take part in a peer tutoring program in which 42 senior students (Year 3 and Year 4) had volunteered to act as tutors. The study took place over the course of the 2014 academic year. All participants were provided with a 1-hour information session, detailing the program's objectives, the logistics of organizing tutor groups, and the tutorial format.

Logistics

Year 1 students were taught by Year 3 students and Year 2 students by Year 4 students. Three to four tutees were randomly assigned to a pair of tutors. Tutors were allocated in pairs to ensure that at least one tutor was available for each tutorial. Tutee groups were created based on existing clinical tutoring groups at the hospital, ensuring that tutees within a group were all present at the hospital on the same day, with similar schedules, to facilitate planning. It was suggested that tutorials occur at a minimum of fortnightly, with more frequent sessions if desired.

Format of tutorials

Tutorials were ~1 hour long, covering clinically relevant content. Tutees were responsible for identifying a topic and notifying the tutor of each tutorial a few days in advance of the tutorial, allowing adequate preparation time for the tutors.

Tutorials were designed to supplement existing teaching in order to enhance the tutees' knowledge base. Once the topic was identified, tutors drove the style and method of teaching. The delivery was intended to be interactive rather than didactic, with the ideal tutorial having 20 minutes of explanation of a concept, 20 minutes of application of the content, and 20 minutes showcasing a clinical example (eg, a patient on the wards or laboratory results). This format was flexible according to the tutor's and tutee's preference.

One-page handouts were created for content-driven tutorials. This encouraged tutors to remain concise and clear. Handouts were uploaded to a shared online folder, accessible by all program participants, allowing students to benefit from other tutorials in addition to their own. In order to minimize the potential of incorrect content being taught, Junior Medical Officers at the Royal Prince Alfred Hospital reviewed the handout content prior to tutorials.

Assessing effectiveness of the program

All participating tutees (n=66) were asked to complete a questionnaire regarding their experience and program outcomes. The questionnaire consisted of 13 closed items, with responses ranging from "strongly disagree" (1) to "strongly agree" (5) on a 5-point Likert scale. The questionnaire also included four open-ended questions to gain insight into reasons for responses to closed questions. These questions addressed: 1) motivation for participation, 2) most useful

aspects of the program, 3) suggestions for improvement, and 4) plans for future participation. Descriptive statistics were used to analyze the data.[14]

Ethical approval was obtained from the Human Research Ethics Committee of The University of Sydney.

Results

A total of 66 of 101 (65%) Year 1 and Year 2 students took part as tutees and 42 of 106 (40%) Year 3 and Year 4 students as tutors. Of the 66 tutees, 34 (52%) were Year 1 students and 32 (48%) were Year 2 students. Of the 42 tutors, 19 (45%) were Year 3 students and 23 (55%) were Year 4 students.

Just over half of the tutees (35/66, 53%) completed the questionnaire, who comprised 15 of 34 (44%) Year 1 tutees and 20 of 32 (63%) Year 2 tutees. Respondents were evenly divided between males (n=16, 46%) and females (n=19, 54%), with a median age of 25 years, which was the same as the median age of their tutors. The frequency of attendance of tutorials is shown in Table 1. Over the 7-month period of this program, 40% of tutees participated in four to six tutorials, with a range from one to 13 tutorials.

Quantitative responses

Domain

Figure 1 demonstrates responses to questions addressing "domain" within a CoP. Among the tutees, 97% enjoyed participating in the program, 97% felt that tutorials were pitched at the right level for their knowledge base, and 90% felt that they were interested in the topics covered. Moreover, 74% of the tutees selected and informed their tutor of the topic of discussion in advance of the tutorial. However, only 40% of the tutees reviewed the concepts discussed in the tutorial following the tutorial.

Community

Figure 2 shows responses to questions addressing "community" within a CoP. A highly positive response (91%) was noted toward the program, fostering a sense of community at the CCS. Furthermore, all respondents (100%) believed that, as a consequence of the program, they would be more likely to take part in the program in the following year. In addition, 80% indicated that they would be more likely to engage in teaching activities during their overall medical career.

Table 1 Frequency of attendance of PAL tutorials by tutees

Number of tutorials	Frequency	Percent
1–3	5	14
4–6	14	40
7–10	9	26
11–13	6	17
Missing	1	3
Total	35	100

Abbreviation: PAL, peer-assisted learning.

Practice

Figure 3 demonstrates responses to questions addressing "practice" within a CoP. In terms of preparation, 91% of the respondents felt that their tutor was adequately prepared for tutorials. The majority (97%) of respondents found the small-group format effective for teaching. A sense of improved understanding of medical concepts and of preparation for clinical exams was reported by 97% and 91% of the participants, respectively. However, only 46% felt that the program improved their sense of preparation for written exams.

Qualitative responses

Responses to open-ended questions are summarized in Table 2. The most frequent reasons for participating in the program included the provision of additional learning opportunities (18/35, 51%) and the intimate knowledge senior peers might pass on (12/35, 34%). Similarly, students found the fulfillment of these motivating factors to be the most useful aspect of the course (19/35, 54%, and 13/35, 37%, respectively), along with the discovery that the tutorial format accommodated more targeted, individualized lessons (7/35, 20%). The main suggestion for improvement of the program was solving scheduling conflicts (15/35, 43%). Interest was expressed in both learning (20/35, 57%) and teaching (28/35, 80%) in the program in the future.

Discussion

The peer tutoring program is the first of its kind at the CCS. It was entirely student driven and organized and was borne from a desire to enhance learning opportunities among medical students studying the same curriculum. This study was designed to explore tutees' perceptions of the program. Areas of benefit are identified within the framework of the main characteristics of a CoP (domain, community, and practice).[13] When viewed through this framework, it becomes apparent that benefits from the program were dependent upon the group environment, relying on other members to share knowledge, advice, resources, and comradeship.

Domain

Domain refers to the students' shared interest and competence. As seen in our qualitative data, tutees identified the desire

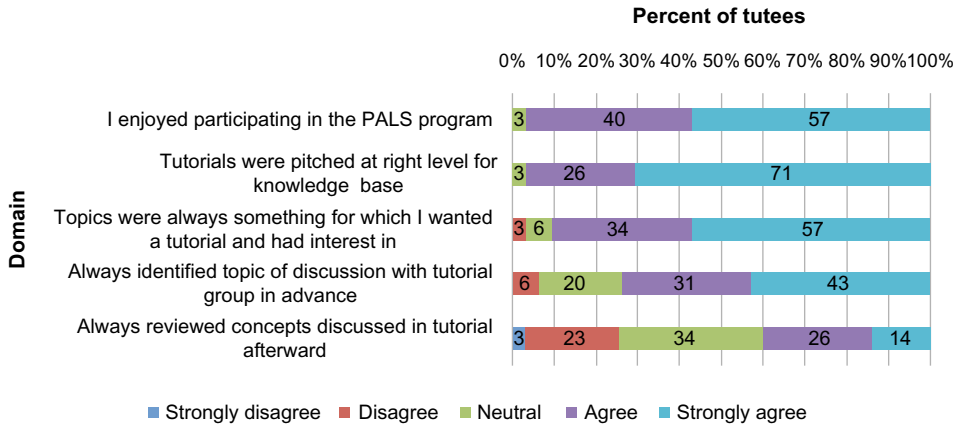

Figure 1 Questions regarding "domain" within the peer tutoring program.
Abbreviation: PALS, peer-assisted learning scheme.

for assistance in learning course content and to receive this assistance from peers with proximity in experience – to have the "opportunity for reinforcement of clinical and lecture material" and to "gain valuable knowledge from the students in higher year levels" – to be the most motivating factors for participating in the program. Tutees perceived that teaching topics were well defined, with the majority of respondents positively scoring each tutorial's appropriateness for the level of knowledge and interest and identification of scope.

The majority of tutees (97%) enjoyed participating in the program. Furthermore, assistance in learning course content from senior peers was not only motivating for tutees but also identified as the most useful outcome of the program. The established literature, supported by our data, suggests that this is largely due to the supplementary nature of peer-assisted learning, elucidating the established content rather than adding to it.[6] The heterogeneity we found in response to the question of whether tutorial concepts were revised post-tutorial may provide further support for the supplementary purpose of the tutorials. It is likely that the tutorials themselves served as a space for revision of the course content, thereby invalidating further revision post-tutorial.

Community

One of the founding tenets of peer tutoring is the need for social learning.[15] Group unity and friendship can act as motivating factors for learning as peers actively help one another.[16,17] Additionally, the practice of learning with others can help students intersect knowledge and construct an understanding of concepts together ("co-construction").[11] The desire for such a community was noted to be a motivating factor for tutees participating in the program, with one student commenting, "Good to build some inter-year relationships and help foster a 'community' spirit at RPA". The majority of tutees in our study also positively scored the program's sense of community, suggesting that a successful community spirit was ultimately achieved.

The tutees were the newcomers to the medical program and curriculum. In order to learn effectively, newcomers must be given the opportunity to participate meaningfully in the community into which they are entering.[12,18] The very

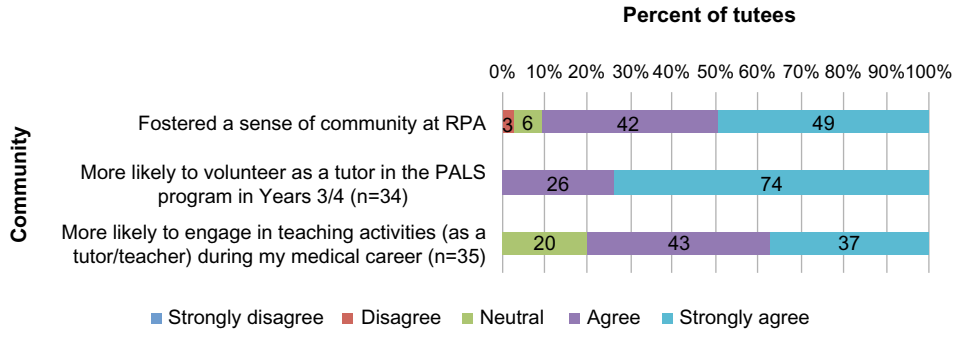

Figure 2 Questions regarding "community" within the peer tutoring program.
Abbreviation: PALS, peer-assisted learning scheme.

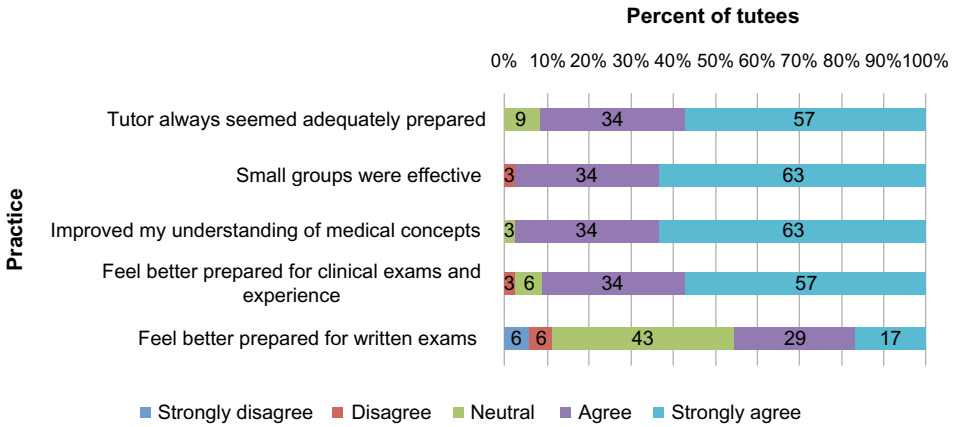

Figure 3 Questions regarding "practice" within the peer tutoring program.

nature of our peer tutoring program required engagement of all members within a tutorial group, within and across year levels, to coordinate tutorials, assess mutual understanding, and share knowledge and resources.

A positive community experience is more likely to encourage future participation in a CoP. Our study found that 100% of the tutees wanted to take part again in the program next year. Additionally, our data suggest that, while being tutored, tutees recognized the benefits of teaching, as a large majority (80%) of our tutees demonstrated interest in teaching in the future. Those who teach through peer tutoring find that while altruistically sharing knowledge, they are also practicing, revising, and learning more about the skills they pass on.[1,19]

Practice

Group size is a defining factor in the effectiveness of peer tutoring.[2,20] The advantages of small groups in providing an optimal space for learning include greater attention provided to tutees,[21] increased opportunities for interaction and questioning,[22] and more targeted learning.[8] Tutees in our study highlighted the advantage of the small student-to-teacher ratio. Targeted learning, in particular, was facilitated by tutees selecting topics for tutorials in advance, meaning that the tutorials covered self-identified gaps in knowledge.

One of the most important methods of peer tutoring is experiential teaching, where teaching and learning are conducted through practical "hands-on" means.[1] Our study found a positive response to the tutorials' usefulness for learning not only medical concepts but also clinical and bedside skills. Such practical preparation was frequently commented upon in free-text feedback: "[…] we mainly did OSCE practice and that was greatly helpful". Interestingly, the variability in response to the usefulness of tutorials in preparing for written exams suggests that the content covered was more clinically useful, rather than assessment driven.

Incidental insight can be provided from peers with proximity in experience. Tutees perceived that receiving "insider knowledge" and preparatory advice about the course and medical life – the "hidden curriculum"[23] not conveyed through the medical course – was unexpected, but a valued learning area for tutees. Proximity in experience also creates a more comfortable, friendlier learning environment due to a reduced sense of authority. With peers as teachers, there can be a more effective and trusting dialogue established in the learning process, rather than a traditional teacher–student instructional relationship.[24,25] Our data confirmed this lack of intimidation to tutees as a helpful aid to learning.

Areas of improvement

Tutees requested improvement in two areas. First, difficulties were encountered in establishing regular tutorial sessions. This was evidenced by 40% of tutees attending only four to six tutorials over the 7-month period of the program, despite the suggestion that tutorials occur every 2 weeks at a minimum. The inconsistency occurred for a number of reasons. Students found themselves busier toward the end of the academic year, with organization of tutorials decreasing at this time. Students also experienced difficulty in finding time slots that were free for both tutors and tutees. A regular timetable, with the same time slot fortnightly, established in coordination with the CCS staff, could resolve these difficulties. A system such as this is consistent with the concept of "protected teaching time",[26] in which fixed schedules permit teaching to occur regularly and reliably and reduce the risk of struggles in an organization.

Second, several students suggested an expansion of the program to include larger tutorials or workshops on a one-off

Table 2 Tutees' responses regarding the PALS program

Question	Themes	Example quotes	Frequency of responses displaying this theme
Reason for participating	Theme 1. Assistance with learning and reinforcement of the course content A way to learn, revise, and strengthen that which is taught in the course, both theory and practical	"As an opportunity for reinforcement of clinical and lecture material". "Get more practice in clinical examination and get ready for OSCEs".	18/35 (51%)
	Theme 2. Proximity of experience A desire to learn from and be advised by those who have already learned the same information in the same course	"Opportunity to go over difficult concepts with someone who has recently learned the same information. Helpful exam advice from people who have sat the exams previously". "Thought it would be a great opportunity to gain valuable knowledge from the students in higher year levels about medical knowledge, clinical experience and general information about life as a medical student at RPA".	12/35 (34%)
	Theme 3. Community The opportunity to meet other members of the medical program	"Wanted to … get to know the 4th and 3rd years". "Good to build some inter-year relationships and help foster a 'community' spirit at RPA".	4/35 (11%)
	Theme 4. Learning process A useful format in which to learn	"Great opportunity for small, focused teaching".	2/35 (6%)
Most useful aspects	Theme 1. Learning useful information A gain in knowledge, practice, and resources that was useful both clinically and in exams	"I really enjoyed going over topics which I found particularly challenging with the tutors as to assist in my understanding of the topic. In addition, I always felt much more prepared in terms of clinical work when we had practiced the examination in the PALS session". "Revisional experience/insight. Access to other tutor resources". "The clinical aspects – we mainly did OSCE practice and that was greatly helpful".	19/35 (54%)
	Theme 2. Advice from more experienced fellow students Learning from peers who have an intimate understanding of the medical course, and who also provide a sense of familiarity	"… the fact that they were where we are not too long ago. I was free to ask 'stupid' questions without feeling the pressure". "Working with 4th years, they know how much we should know for our exams, whereas tutors may teach us things that aren't as relevant to us yet". "I also found the little tricks that the tutors gave us to help remember information incredibly invaluable which you generally don't get from our normal clinical tutors or in lectures".	13/35 (37%)
	Theme 3. Targeted learning A lesson format that accommodated a direct focus on individual student desires	"Customized learning". "Targeted coverage of specific areas" "Small groups = more attention".	7/35 (20%)
Suggestions for improvement	Theme 1. Solve scheduling conflicts Establish a more regular tutorial schedule or a method of streamlining tutorial organization to combat coordination difficulties, with an emphasis on scheduling earlier in the year	"More regular scheduling of times? Organizing the groups so that free times are better matched up with tutors. It was often difficult to find common slots to do a tute – 3rd years are so busy!" "Time is an issue, as 4th Years esp have a busy schedule. Starting the PALS earlier in the year before long case and PRINT is an idea".	15/35 (43%)
	Theme 2. Expansion of the program A desire for additional, larger, one-off tutorials on topics that may have importance to more than one group	"Could have some large group voluntary tutorials. Eg, Larger topics (ECG etc)" "We could maybe expand into mini tutes, for a couple of groups at a time for OSCEs or theory – eg, running a 'cerebellar exam' session for any 2nd years who wanted to attend."	3/35 (9%)
Future participation	Theme 1. Learning An interest in continuing to be taught by peers	"More learning please. I don't yet feel confident to teach but may do in the future". "I thought the program was a great idea this year and I would really like to be taught by a PALS tutor again next year".	20/35 (57%)
	Theme 2. Teaching An interest in teaching peers through, or outside of, the program	"Would happily teach – good revision!" "This program has helped me realize the importance of peer teaching/learning and has sparked my interest in teaching in the future".	28/35 (80%)

Abbreviations: PALS, peer-assisted learning scheme; ECG, electrocardiogram; OSCE, Observed Structured Clinical Examinations; RPA, Royal Prince Alfred Hospital; PRINT, pre-internship.

basis, targeting topics of interest to many students, such as electrocardiograms. Such an expansion would have to be considered with a commitment to the principles that guided the creation of the program, retaining the ideas of small groups, taught by peers, with an interactive format.

Limitations

The response rate to the questionnaire was relatively low (53%). The data collection method, which used a paper-and-pencil survey, may have affected the response rate. With participants having varying timetables and being distributed to different parts of the hospital, it was difficult to encourage the return of the paper questionnaires. Furthermore, the survey length of 13 closed items and four open-ended items may have contributed to the response rate. The reduced response rate may have produced a response bias, in which only motivated tutees answered the questionnaire, thus overestimating the positive reaction to the program. Voluntary participation in the program may also have contributed to the response bias, as those who participated already desired and felt positive toward a peer tutoring program. In view of the low response rate, a future study with larger participation would be needed to confirm the findings of this study. Response rates in future studies could be increased by providing an electronic questionnaire, which may provide a greater level of ease and speed associated with its completion, and also by reducing the length of the survey.

Conclusion

We utilized the CoP theory as a lens to view and assess the experience of tutees in a formal peer-assisted learning program.[13,27] Tutees found the peer tutoring program to be enjoyable and useful. The program provided a motivating and resourceful environment for tutees to revise the curriculum content and learn from experienced peers. Importantly, tutees indicated a commitment to continued participation both as tutees and through future tutoring opportunities. We have shown that a peer tutoring program with a clear objective, a unified community, and a pool of valuable resources for teaching can yield a productive learning environment for junior students.

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Author contributions

Audrey Menezes is a graduate of Sydney Medical School and is now undertaking her first year as a Junior Medical Officer at Hornsby Hospital, Sydney, Australia. Audrey was responsible for the study concept and design, analysis and interpretation of data, and drafting of the manuscript.

Annette Burgess is an Executive Officer and researcher at the Central Clinical School, Sydney Medical School. Annette was responsible for the study design, analysis of data, and contribution to and revision of the manuscript.

Antonia J Clarke is a graduate of Sydney Medical School with Honors and is now undertaking her first year as a Junior Medical Officer at the Royal Prince Alfred Hospital, Sydney, Australia. Antonia was involved in the study concept and design and revision of the manuscript.

Craig Mellis is a pediatric chest physician and currently Associate Dean and Head of the Central Clinical School, Sydney Medical School. Craig was responsible for the revision of the manuscript and for important intellectual content.

All authors read and approved the final manuscript.

Disclosure

The authors report that they have no conflicts of interest in this work.

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