RESEARCH ARTICLE

In their own words: a comparison of the medical school applications of low and exceptional performing students

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Joseph M. Maciuba, Yating Teng, Matthew Pflipsen, Mary A. Andrews, Steven J. Durning

Uniformed Services University, Bethesda, Maryland, 20814, USA

Abstract

**Background:** Medical school admissions committees cannot predict performance. Previous research has studied whether standardized test scores, grade point averages, or letters of recommendation portend success, but an applicant's reporting of their past experiences and activities has not been well studied. This research aimed to determine the themes present in the applications of low performing medical students and to compare these themes with those in the applications of exceptional performers.

**Methods:** The authors performed a qualitative analysis of the Work and Activities section of the American Medical College Application Service application in low performing medical students (those referred to the student promotions committee where an administrative action occurred). A constant-comparative approach was used that applied an a priori thematic framework developed in exceptional students (those inducted into the Alpha Omega Alpha honor society and Gold Humanism Honor Society). Frequencies of themes were counted and compared in each population by calculating the absolute number of themes and the diversity of themes per applicant.

**Results:** Thirty-nine students met the definition of low performer in graduation years 2017 to 2019. Thematic saturation occurred after 18 applications; 21 files were reviewed. All seven themes present in exceptional performers (teamwork, altruism, success in a practiced activity, wisdom, passion, entrepreneurship, and perseverance) were present in low performers, although at lower frequencies. Three low performer themes were found: witnessing teamwork, description of a future event, and embellishment of achievement.

**Conclusions:** Experience descriptions that prospective students write may predict future performance and could be used by admission committees to inform entry decisions into medical school. Low performers had comparatively lower frequencies of every exceptional performer theme; the difference was most notable in the
“perseverance” and “success in a practiced activity” themes. Unique themes were found in low performers. Further studies are recommended to enhance the generalizability of these results.

**Keywords**
Medical School; Admissions; Grit; Deliberate Practice
Introduction
Medical school admission committees have reliably accepted prospective applicants who can withstand the rigors of medical training and graduate but are less able to identify who will excel and who will struggle.

Previous research has attempted to ascertain if different components of the medical school application can predict success in medical school\(^2\). Underperformance during the first year of study has been associated with lower mean undergraduate science grade point average (GPA), entry into medical school via an accelerated program, and older age\(^1\). The Medical College Admissions Test (MCAT) score has been shown to be predictive of preclinical performance and the passing of licensure exams\(^3\)-\(^4\), but it has not portended success during clerkships or intern year\(^5\). Letters of recommendation also have not predicted achievement during medical school\(^6\). Finally, the synthesis of these application components by selection committees is not reliable in predicting which applicants will excel throughout their tenure in undergraduate medical education: there is only a weak association between admission committee tertiary review comments and medical school performance, regardless of positive or negative comments\(^7\).

The applicant’s reflection and reporting of their own past experiences in the free-response areas of the Work and Activities section of the American Medical College Application System (AMCAS) application is not well studied and may provide unique insights into future performance. In this portion of the medical school application, prospective students can write about themselves and their extracurricular activities, which may include shadowing experiences, hobbies, leadership roles, or sports. This section may show promise for predicting achievement, as previous work by Pflipsen \(et\ al\) identified seven themes present in the Work and Activities section of exceptional medical students: passion (an intense interest in an activity), perseverance (the ability to overcome hardship), entrepreneurship (taking initiative to accomplish something), success in a practiced activity (dedicated engagement in an activity leading to improvement or accomplishment), altruism (desire to selflessly help others), and teamwork (an appreciation for collaboration)\(^8\). However, it is unknown if these themes and/or additional themes are present in low performers.

The aim of our study is to apply this previously created thematic framework to students who performed poorly in medical school because of academic and/or professional reasons. This will determine if differences exist between the two populations (e.g., new themes in low performers and/or differences between the frequencies of themes between exceptional and low performing graduates). We hypothesize that a difference may exist because this study is based on the theories of grit and deliberate practice as both theories do not place an emphasis on raw talent or innate intelligence but rather on one’s ability to overcome hardship or one’s approach to training\(^9\)-\(^10\).

The theory of grit is defined as a combination of passion and perseverance through difficult tasks. It is described as a non-cognitive trait and is thought to be just as important as intelligence in becoming successful\(^\text{11}\). The concept of grit can be applied to any activity on a medical school application if the prospective student shows how he or she overcame challenges and setbacks to accomplish a goal or complete a task.

The theory of deliberate practice states that developing expert performance not only depends on how much one trains but how the training is done (deliberate or effortful practice)\(^10\). The use of deliberate practice can occur through specific mechanisms such as self-reflection or seeking feedback from mentors. Evidence to support both theories may be manifested in medical school applications through the development of skills in sports, music, or other hobbies and activities.

If we find a divergence in how low performers and exceptional performers describe themselves, admission committees may be able to use this information to improve their selection decisions. This is important because not only does remediation of low performing medical students take time and effort, but medical schools also have a duty to society to produce the best possible physicians. Further, the knowledge obtained from this study may help de-emphasize standardized test scores and grade point averages from the admissions process, a goal that aligns with the Association of American Medical Colleges’ push for more holistic admissions policies.

By analyzing the applications of low performing medical students using an a priori thematic framework developed in exceptional performing medical students, we aimed to answer the following research questions: Are the same themes present in the medical school applications of low performing students as exceptional performing students and do these themes occur at the same frequency in the two populations?

Methods
Design
We performed a qualitative study that assessed the Work and Activities sections of the AMCAS applications of medical students who graduated between 2017–2019 at the Uniformed Services University (USU). We also searched for themes if applicants reported and described their disadvantaged status or if any previous institutional action had occurred. We had complete data for this cohort of graduates, which were also the graduation years used for our exceptional performing graduates\(^9\). Prospective medical students can describe up to 15 experiences on the AMCAS application; three of these experiences can be designated as “most meaningful” and additional space is provided for an in-depth description by the applicant. The text written by applicants was the primary data for this study. USU is a federal and military medical school located in Bethesda, Maryland.

Participants
We defined low performers as students referred to the student promotions committee with an administrative action, such as a letter of reprimand, a period of academic probation, or a decision to decelerate or disenroll from the School of Medicine. We chose this definition because a form of a student promotions committee likely exists at every medical school.
Exceptional performers were those students inducted into both the Alpha Omega Alpha honor society and the Gold Humanism Honor Society (GHHS), a definition chosen to account for students who not only excelled academically but also displayed high levels of professionalism and humanism in medicine.4

Data analysis
We used an a priori thematic framework to complete a thematic analysis in the AMCAS applications of low performers11. The themes of teamwork, altruism, success in a practiced activity, wisdom, passion, entrepreneurship, and perseverance were developed through an inductive approach from the applications of medical students who demonstrated exceptional performance.11 We used a constant comparative technique and coded until thematic saturation was reached. Thematic saturation occurs when the review of additional data does not reveal any more novel themes or insights8. As is consistent with this methodology, thematic saturation was determined through the consensus of the research team. New themes were identified and agreed upon by the entire coding team. The applications of exceptional performers were then re-reviewed to determine the presence of low performing themes. All coding occurred in NVivo R1.4.1 (QSR International, Burlington, Massachusetts).

The primary coders were JM (a general internist and education student) and YT (an educational researcher). Each file was coded independently by JM and YT; these codes were then discussed with MP (a family practice physician), MA (a general internist and medical educator), and SJD (a general internist and medical education researcher) until consensus was reached. MP and SJD had previously analyzed exceptional performers and thus ensured consistent coding between exceptional and low performers.

To further contrast the exceptional and low performing populations, we tabulated the total number of codes and the diversity of codes in each applicant for themes present in both exceptional and low performing graduates. We also collected demographic information including age, reported gender, highest MCAT score, and cumulative uGPA. Descriptive statistical analyses were performed using Google Sheets (Google, 2021).

This study was approved by the Institutional Review Board at the Uniformed Services University (USUHS.2020-042). Due to the retrospective nature of this research, with students who had already graduated from medical school, written consent was not required by the Institutional Review Board. All included quotes were edited to ensure the confidentiality of these applicants.

Results
In the graduating classes of 2017–2019 at the Uniformed Services University, we identified 39 low performers. We reached thematic saturation after surveying 18 applications, and we coded 21 applications in all (7 applications from each graduating class).

Of these 21 individuals, eight were female and the average age of this population was 25 years old (range 21–38). The average highest MCAT score was 30.6 (range 26–34) and the average cumulative undergraduate grade point average was 3.49 (range 2.76–3.82). These demographics appeared like the population of exceptional performers from the same years which included 22 students. In the exceptional performers, the average age of the applicant was 26 (range 22–40) and nine identified as female. The average of their highest MCAT score was 31.5 (range 27–36), and their mean uGPA was 3.59 (range 2.71–4.0).9

Exceptional performer themes
We identified passages that rose to the level of the seven exceptional performer themes in medical school applications of low performing students. Brief definitions of these themes and representative quotes are found below.

Altruism. Defined as a sincere eagerness to assist others leading to an inward satisfaction, altruism was the most frequent exceptional performer theme represented in low performing medical students:

“By taking the time to communicate in what was often a non-professional circumstance and by showing genuine interest in another’s wellbeing, I believe I was more effective at fulfilling my mission of advocating healthy habits.” (L007)

Entrepreneurship. This theme was characterized by creating something or improving a process. A description of duties and responsibilities of a job or a leadership role did not meet the level of this theme; however, passages that expounded on bettering an organization or institution met the definition of entrepreneurship:

“As chair, I was elected out of 140 members. I had to organize and plan events, heading a committee of about twenty women. We had a 300% increase in attendance when I was chairwoman because I made sure that every invitee was called personally before the event.” (L005)

Success in a practiced activity. We distinguished the success in a practiced activity theme by finding passages that indicated training or practice that led to improved performance or achievement. The nature of this training could either be implicitly or explicitly described; some students detailed their training activities while others clearly demonstrated their performance without stating how they practiced:

“The following year, I attended every optional morning practice, spent extra time in the weight room, and took every opportunity for improvement. When the coach told me I would be competing in championships, it was an incredible feeling.” (L001)

“Four-year member of the men’s varsity team and team captain. I helped lead the team to 4 straight top 5 rankings in the region, and 4 straight top 20 national rankings. We won the conference over Division 1 opponents while being ranked as high as 14 in the region.” (L017)
**Passion.** In order to meet the definition of this theme, the applicants had to show an intense pursuit of an interest. It was often found in connection with music or sports, though it could potentially be applied to any activity.

“Becoming a professional musician in a premier band was my dream for many years--from high school all the way through my graduate training. I’ve been able to perform for and teach music students from teenage years up through graduate students. I will continue to play and teach--music will always be a large part of my life.” (L018)

**Perseverance.** Perseverance was defined as the ability to overcome obstacles and setbacks in order to accomplish a goal. This theme was seen in conjunction with military training, academic probation, and sports:

“My freshman year, I did not make the varsity squad. Despite failing, I decided I would not give up my goal to play varsity. Athletics honed my ability to perform under pressure, to take criticism in a positive way, and to learn from failure. Through persistence and hard work, I became a meaningful varsity contributor the next three seasons.” (L016)

**Wisdom.** This theme was characterized by the recognition of a new life lesson or self-discovery after performing a job or completing a project. The theme of wisdom manifested as a realization of personal growth in a student’s description of their work and activities and it could occur either in a clinical or a non-clinical setting. Wisdom was the second most common theme in low performers behind altruism.

“I learned to recognize patients that needed ‘extra space’ and independence...over time, I learned to recognize their individual needs more acutely. Instead of holding a patient’s arm to walk down a hall, I would first ask them. Often the patient wished to walk on their own, get their own water, or deal their own cards. These moments demonstrated incredible resilience – despite their physical limitations, the patients refused to see themselves as ‘limited.’ I learned that many patients did not want a servant for each physical task but an empathetic observer, listener, and friend.” (Clinical Setting, L016)

“Martial arts taught me to defend myself, but more importantly it taught me never to underestimate anyone and to always try and improve myself.” (Non-clinical setting, L028)

**Teamwork.** We described teamwork as the recognition of the importance of working together to achieve a common goal. There was the least amount of difference between exceptional and low performers in the percentage of applicants with this theme present.

“Like no other group project, this experience tested and improved my team working skills. I worked not only with my local teammates but also with our foreign counterparts, often through email and Skype. We worked on separate parts, putting them together to work synergistically. These skills will allow me to work well with an interdisciplinary healthcare team to provide the best, complete care.” (L030)

Further representative quotes for these seven themes in the low performing cohort are found in Table 1.

**Theme frequency**

While all seven themes were present in the medical school applications of low performers, they appeared at a lower frequency: there were an average of 3.81 total themes present per low performing application compared to an average of 7.86 themes per application in the high performing population. There was also less diversity of themes in each low performing applicant when compared to each exceptional performer. A low performer had a mean of 2.8 different themes per application present while exceptional performers had a mean of 4.5 different themes present. When comparing the percentage of applicants with themes present, the largest contrast between exceptional and low performers was in the success in a practiced activity theme (38% vs. 73%) and the perseverance theme (19% vs. 55%) (Figure 1).

**New themes.** We identified three new themes in the low performing data: witnessing teamwork, description of a future event, and embellishment of achievement.

**Witnessing teamwork.** When comparing passages from the applications of low performers to those of exceptional performers within the theme of teamwork, we discovered a difference that was isolated to low performers: Low performers sometimes described teamwork from the perspective of an observer rather than a participant. This is what we called “witnessing teamwork,” and defined it as an observation of a group or collaboration without active participation.

“My position gives me a great appreciation for the cooperation required among the staff of an emergency department. From the second an individual comes through the door, a team of doctors, nurses, and support staff moves into action. These interactions between the staff directly correlate to the efficiency of care provided. If the staff does not communicate effectively, time is wasted, and the quality of treatment often suffers. In the ER, patient care is not solely the responsibility of the physician but is dependent on the cooperative efforts of the entire staff.” (L032)

**Description of future event.** A description of a future event was defined as an elaboration of an experience that has not yet occurred. This might include a job or experience to which an applicant has been accepted but has not yet completed or an applicant might refer to a research project that has not yet come to fruition, and it included phrases such as “I will,” “I anticipate,” “I plan,” or “I intend:”
<table>
<thead>
<tr>
<th>Theme</th>
<th>Definition</th>
<th>Representative quote</th>
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<tbody>
<tr>
<td>Teamwork</td>
<td>An appreciation for or reflection of the value of teamwork, collaboration,</td>
<td>“Working in this club has allowed me to learn to be a leader and to learn to work as a team member. Every one of our events has taken a lot of teamwork and effort to put together and from this I now know how to work with people from different backgrounds and how to think in different ways which will allow me to become a better team member in the hospital when working with other healthcare professionals.” (L028)</td>
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<td></td>
<td>interpersonal relationships and/or camaraderie</td>
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<tr>
<td>Wisdom</td>
<td>Gaining of new insight, self-discovery, or awareness from an experience or</td>
<td>“This experience also taught me patience and humility in having to admit mistakes or take responsibility for things that I sometimes could not control. All types of people, in different moods and with different perspectives and expectations, come through the store, and in order to help them, I must strive to understand and meet these expectations. I believe many of the lessons I learned in interacting with customers can be applied toward interacting with patients.” (L017)</td>
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<td></td>
<td>activity, resulting in an examination of an internal thought process that</td>
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<td></td>
<td>leads to personal growth, either in clinical or non-clinical settings</td>
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<tr>
<td>Perseverance</td>
<td>An ability to overcome hardship, adversity, difficulty, or setback through</td>
<td>“My semester of academic probation, however, sparked abundant long-term growth and productivity. I learned the hard way that the dignity associated with never giving up at one thing can come at too high a cost if overall performance is compromised. The solution I have chosen is to raise my standards, accepting only whole-hearted effort, and preemptively targeting weaknesses. I did not possess the necessary emotional tools to take advantage of courses early in college, but in time I have adapted my methods in order to get the most of this endeavor. I consider this a positive outcome.” (L006)</td>
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<td></td>
<td>hard work, commitment, or determination</td>
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<tr>
<td>Passion</td>
<td>An intense interest in an activity or pursuit</td>
<td>“I began taking lessons during the summer, which helped me to understand my major from first-hand experience. I finished my training and earned my certificate the next year. I joined the team upon returning home from my study abroad. Once on the team, I competed in 2 national competitions as well as 1 regional competition.” (L030)</td>
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<tr>
<td>Success in</td>
<td>Demonstrating either implicitly or explicitly ongoing practice and dedicated</td>
<td>“This experience taught me how to lead by example, which forced me to prepare more, practice more, and perform better than other students in the studio. As a principal musician, I learned how to represent my section and the School of Music.” (L004)</td>
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<tr>
<td>a Practiced Activity</td>
<td>engagement in an activity which led to an improvement in one's ability or</td>
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<td></td>
<td>resulted in success</td>
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<tr>
<td>Entrepreneurship</td>
<td>Taking initiative to accomplish, create, or improve something</td>
<td>“I started this club along with a classmate to increase awareness about the need for organ donation, help alleviate peoples’ concerns with organ donation, and to encourage people to sign up for the donation registry.” (L019)</td>
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<tr>
<td></td>
<td>A genuine desire to selflessly help an individual or community and reflects</td>
<td>“My service trips in college gave me a sense of direction that I carry with me every day. I deeply enjoyed being part of a group of people with a shared desire to serve others and the adventure of going someplace new to do it. On these trips, people were voluntarily taken out of their comfort zone and accepted work and accommodations that they would not have typically experienced. These sacrifices were made in order to serve others, and the people that went on these trips rarely had the same outlook on life when they returned as when they left.” (L022)</td>
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<td></td>
<td>an internal reward the student feels from their experience</td>
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This table contains exceptional performer themes, definitions, and additional representative quotes from the low performing population.
“I will complete an intense training regimen before taking a written and verbal certification examination. I will then be responsible for disconnecting my patients from their apparatuses in the emergency room and completely preparing them for departure to their permanent location in the hospital. I will transport patients and their paperwork from the ER to the nurses waiting for them in their determined hospital wings.” (L002)

**Embellishment of achievement.** Embellishment of achievement was defined as describing or listing an honor, award, or activity as better than it is. An example would be overstating involvement in a specific activity, or listing an activity as an honor or award even though the applicant had not actually won the competition:

“I was nominated by my professor...he later informed me that out of all the nominees, I was number 2 in-line for this award for the year.” (L006)

Another example would be an activity that was listed as a publication even though the research project is not finished, submitted, or accepted:

“For the past three years I have been working on a research project. I am currently adding the last pieces of data, and plan on submitting the paper by the end of August or early September.” (L032)

**Discussion**

The results of this thematic analysis of applications of low performing medical students using an a priori thematic framework, derived inductively from the applications of exceptional performers, suggests that differences may exist in how the two groups describe themselves and their experiences.

The new themes found in low performers may be useful to admission committees to distinguish which prospective applicants may perform poorly during medical school. The presence of the description of a future event theme and the embellishment of an achievement theme may simply be due to applicants’ attempts to strengthen a weak application to medical school. The overstating of one’s achievements occurs at every level of academic promotion and these two themes might be manifestations of what one paper has hypothesized are “little lies.” For example, applicants may know their manuscript has not been published yet or that second place is not deserving of an award, but they hope that the manuscript will be published by the time of the interview or that just being nominated was considered an honor by the admissions committee.

The last new theme of witnessing teamwork is a subtle divergence from the main theme of teamwork. It is the difference between active and passive participation in a group setting. Students who value teamwork may integrate themselves better into their healthcare teams during their third year of medical school, and students with higher levels of grit and who make use of deliberate practice may also more quickly earn the trust of their team, leading to more participation than observation in the healthcare team. Due to the pass/fail nature of most medical schools in the preclinical years, clerkship grades often determine the eligibility of induction into Alpha Omega Alpha and thus explains why the witnessing teamwork theme may be associated with low performance.

The themes of perseverance and success in a practiced activity appeared to have the largest contrast between the two groups which is consistent with the theoretical underpinnings of our research. These findings may be useful in helping admissions committees predict not only which applicants will likely perform better in medical school but also which admitted students may need academic support.

The theme of perseverance may be particularly useful for selection committees and medical schools. Given that exceptional performers appear to have higher frequencies of the perseverance
theme in their applications than low performers, the exceptional performers in our study may be grittier than low performers. This claim is supported by other research that found that higher grit scores have been linked to finishing medical school on time and to having a higher rank in the class. At the University of Pennsylvania, higher grit scores were also associated with higher grades, especially when Standardized Admissions Test scores were held constant. As there are similar standardized test scores between our two populations, this also suggests that admissions committees may be able to emphasize perseverance and grit over MCAT scores when deciding whom to admit and to predict performance in medical school.

While the differences in perseverance may be explained by different levels of grit, the higher frequency of the success in a practiced activity theme in the exceptional performing group may be explained by the theory of deliberate practice. Exceptional medical students may be more likely to approach their activities and their studies in an intentional manner and with more motivation. Previous research supports this finding: higher achieving medical students are more likely to participate in self-study activities, own more books, read more journal articles, and are more likely to plan out their study schedule. Our data and previous research not only suggest that medical selection committees would want to admit students who show more use of deliberate practice prior to medical school, but also that medical schools could consider coaching and mentorship programs to those admitted students who show lower levels of the success in a practiced activity theme on their application.

There are several strengths of this study. One is that it can be reproduced at almost any North American institution. The AMCAS application used by many medical schools around the country, and many medical schools induct medical students into AOA and GHHS. As there are similar standardized test scores between our two populations, this also suggests that admissions committees may be able to emphasize perseverance and grit over MCAT scores when deciding whom to admit and to predict performance in medical school.

However, there are also several limitations with this study. First, this is a single institution study that only reviewed applications to Uniformed Services University, a public and military medical school. Second, the definition of exceptional performers being those students who are inducted into these honor societies is not without potential bias. Third, our study size was small due to our decision to perform a qualitative analysis, thus any significant quantitative inferences based on such limited numerical data should be made with caution, if at all. Fourth, our study may not generalize to average performing medical students—those students who are not considered exceptional or low performers.

Future research could seek to replicate our study at different medical schools during multiple time periods to help determine the generalizability of our results to other institutions in North America. Additionally, these themes could now be applied to blinded AMCAS applications to ascertain if these themes have evidence of predictive validity for exceptional or low performing medical students. Finally, one could use our themes in average performing medical students to identify differences among the applications of exceptional, average, and low performing medical students.

**Conclusions**

In conclusion, we performed a thematic analysis of medical school applications of low performing medical students using a constant-comparative method that employed an a priori thematic framework derived from exceptional performing medical students. While limited, our findings suggest that a difference may exist in how low and exceptional performers describe their activities and experiences that is consistent with theoretical expectations. This difference may be useful to selection committees when deciding whom to admit and medical school deans when determining how admitted students may be likely to perform during medical school.

**Disclaimer**

The views expressed in this article are those of the authors and do not reflect the official policy of the Department of the Army, Department of the Navy, Department of the Air Force, Department of Defense, or U.S. Government.

**Data availability**

The datasets generated and/or analyzed during the current study are not publicly available to maintain the privacy of the medical school applicants. This research was approved by the IRB on the condition that these datasets are not to be shared with other institutions, because the applications could not be effectively de-identified due to the presence of names and the last four digits of applicants’ social security numbers. For questions regarding intermediary data, interested parties can contact the primary author at joseph.maciuba@usuhs.edu.

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