## **Original Article**

# Why Do Dentists Refer to Specific Orthodontists?

#### Perspectives of the General Dentist

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### ABSTRACT

**Objective:** This study tested the hypothesis that the quality of treatment outcomes and overall patient satisfaction are of equal importance in influencing a general dentist to refer a patient to an orthodontist for treatment. The investigation also attempted to determine what specific aspects of an orthodontically treated occlusion comprise an outstanding result in the opinion of the general dentist.

**Materials and Methods:** Self-administered surveys containing 35 questions were distributed to a random sample of 1000 general dentists in the midwestern United States.

**Results:** Three-quarters responded that the quality of previous orthodontic treatment and patient/ parental satisfaction were of equal importance in the orthodontic referral decision. If additional factors were considered, the quality of the treated result as judged by the general dentist was far more important than the location of the orthodontist's office, the reputation of the orthodontist, or the anticipated cost of treatment. With regard to desired postorthodontic occlusal and functional characteristics, the majority of the dentists ranked canine guidance as most important. Other characteristics were Class I molar and canine relationships, even contact of all teeth in centric occlusion, amount of overjet and overbite, absence of spacing, and absence of balancing interferences.

**Conclusions:** The decision of the general dentist to refer a patient to one orthodontist over another is based on a number of interactive factors. It behooves the orthodontic clinician to provide high-quality treatment, to interact well with his or her patients and their families, and to maintain good communications with general practitioners in the community. (*Angle Orthod.* 2009;79:5–11.)

**KEY WORDS:** Referral; Orthodontic treatment; General dentist; Occlusion; Canine guidance; Mail survey

#### INTRODUCTION

Referrals from general dentists are the lifeblood of every orthodontic practice. Yet the reasons underlying why a general practitioner refers patients to one ortho-

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dontist and not another are complex, ranging from professional judgments of previous orthodontic treatment outcomes to personal friendships made outside the office. From a professional perspective, the decision to refer to a specific orthodontist may be based on the dentist's evaluation of completed orthodontic treatment on other patients, as well as patient and parental satisfaction with the orthodontic experience.

Many previous investigations have indicated that the overall quality of treatment provided by orthodontists is important to general dentists when they evaluate orthodontic treatment outcomes and when they make referral decisions.<sup>1–3</sup> These studies, however, did not ask in-depth questions to determine what "quality" actually means to general dentists or what specific aspects of an orthodontically treated occlusion constitute an outstanding result. The current study was conducted to gain knowledge concerning the criteria used by dental practitioners to evaluate the overall quality and specifically the functional and occlusal characteristics of a desirable orthodontic outcome. Further, there also is a lack of detail concerning the ways in which patient and

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parental satisfaction influences the decision to refer. The aim of this study was to test the hypothesis that the quality of treatment outcomes and overall patient satisfaction are of equal importance in influencing a general dentist to refer a patient to an orthodontist for treatment. This increased understanding of the basis of the referral decision will allow orthodontists and general dentists to communicate better concerning the details of patient treatment and ultimate occlusal and functional outcomes. Further, orthodontists can gain insights as to other factors influencing the gatekeeper role of the general dentist in orthodontic patient referrals.

### MATERIALS AND METHODS

A mail survey was used to gather information concerning the opinions of general dentists. Three focus groups of four general dentists each met separately to aid in the development of the questionnaire. All of the attendees were private practitioners from the Ann Arbor and metropolitan Detroit areas of southeastern Michigan. These dentists were asked to fill out the questionnaire as if they actually were taking part in the study. They also were asked to provide any comments or criticisms about the questions, note whether the instructions and questions were clear, and state whether there was confusion about how to answer specific questions. Suggestions on the wording of questions were provided to make the questions understandable to the general dental population. The participants identified which questions were difficult to answer and offered alternatives. The dentists also were asked for their opinions concerning the layout and design of the survey itself and to record how long it took to complete it. After all copies of the survey were collected and evaluated, the guestionnaire was revised using the information provided by the three focus groups.

The final questionnaire consisted of 35 questions over three pages. Questions were mainly of the closed-ended or "forced choice" type, in that a number of alternative answers were provided; the respondent simply needed to select one or more answers. Many of the questions required the respondent to rank items in order of importance. This format forced the respondent to pick the most important characteristics of certain topics from a list of many characteristics.

The questionnaire comprised five sections.

- The first section consisted of three statements that were designed to determine the extent of importance of quality of orthodontic treatment outcome in general dentists' referral decision relative to other factors such as patient satisfaction.
- 2. The next section consisted of a list of eight statements dealing with possible orthodontic referral cri-

teria that general dentists might use when referring patients to an orthodontist.

- 3. The third section consisted of 16 different characteristics of postorthodontic occlusions (eg, presence of Class I molars).
- 4. The fourth section included four characteristics that did not deal directly with the patient's occlusion (eg, absence of decalcification).
- 5. The last set of questions asked background information about each of the respondents, such as age, gender, dental school attended, year of graduation, and postgraduate dental training. Also included were questions about their patient population, orthodontists to whom they referred patients, the number of orthodontic patients they were treating currently, the number of orthodontic patients they treated in dental school, and hours of continuing education taken.

The sample was derived from general dentists in the East North Central Region of the United States. This region is defined by the American Dental Association as the area within the states of Michigan, Indiana, IIlinois, Ohio, and Wisconsin and contains a total of 21,427 general dentists.<sup>4</sup> A list of names and addresses was provided by American Medical Information, Inc., and a sample was chosen by simple random selection. Sample size was estimated using the nQuery Advisor 4.0 computer program (Statistical Solutions, Saugus, MA). Previous response rates on similar surveys, level of significance (alpha = .05), and power level (80%) were considered in the estimation. For chisquare tests, the sample size was estimated at 171 surveys for detecting differences in respondents' opinions with sufficient statistical power. Based on the response rates (ranging from 47% to 75%) from previous surveys conducted in similar geographic and demographic areas as the current study,5-7 1000 surveys were mailed to ensure adequate statistical power.

Each mailing contained an introductory cover letter, a survey questionnaire including a cover page, and a self-addressed stamped return envelope. The inclusion of a return envelope stamped with first-class postage rather than using business reply postage has been shown to increase response rates.<sup>8–10</sup> In the cover letter, the study was explained and the dentists were strongly encouraged to respond in a timely fashion. The cover letter in the second mailing reminded the dentists that their help still was needed and encouraged them again to respond. The cover page of the survey itself included instructions for answering the questions as well as pertinent definitions. A contact telephone number and an e-mail address were provided.

The surveys were sent to each potential respondent

| Responses of General Dentists                                       | Ν   | % of Respondents |
|---|-----|------------------|
| Occlusion/function and patient satisfaction are of equal importance | 269 | 75.4%            |
| Occlusion and function are more important                           | 64  | 17.9%            |
| Patient satisfaction is more important                              | 24  | 6.7%             |
| Total   | 357 | 100%             |

 Table 1. Opinions of General Dentists Regarding the Importance of Patient Satisfaction vs Occlusal and Functional Characteristics of the

 Orthodontically Treated Occlusion

by first-class mail. The first mailing contained a copy of the questionnaire, a cover letter, and a self-addressed stamped return envelope. The second mailing was sent to all of the dentists who did not respond to the first mailing and contained another copy of the questionnaire, a new cover letter, and another self-addressed stamped return envelope.

Data input was accomplished using EpiData software (version 2.1b, The EpiData Association, Odense, Denmark). Data were entered by two different individuals and then compared for differences. Any differences that were found were checked against the original questionnaires and corrections were made.

Data were analyzed using the Statistical Package for the Social Sciences (Version 10.0, SPSS, Chicago, III.) software. Descriptive statistics were applied to the data to obtain distributions, standard deviations, and frequencies for each question. Bivariate analysis was employed using chi-square tests for comparison of demographic factors and patient satisfaction vs occlusal outcome with the rankings of the occlusal/functional characteristics, nonocclusal characteristics, and referral characteristics. Statistical significance was judged at the level of P < .05.

### RESULTS

#### **Response Rate**

Of the 1000 surveys mailed, 12 were returned because of incorrect addresses, and one was returned because of the death of the dentist. Thus, the final target sample size was 987 dentists. The total number of returned surveys was 358 (272 from the first mailing and 86 from the second mailing). The response rate was therefore 358/987 or 36.3%.

#### **Treatment Outcome vs Patient Satisfaction**

In responding to the question regarding general dentists' referrals of patients to an orthodontist, 75% of the respondents answered that the quality of a patient's occlusal and functional orthodontic outcome was of equal importance to the patient's overall satisfaction with the orthodontic experience (Table 1). Eighteen percent of the respondents answered that the quality of a patient's occlusal and functional orthodontic outcome dontic outcome was more important, whereas 7% of

| Table 2.    | Percentage of | of Appearance   | of Each   | Referral  | Character- |
|-------------|---------------|-----------------|-----------|-----------|------------|
| istic, from | the Most Imp  | ortant to the F | ifth Most | Important |            |

| Referral<br>Characteristic <sup>a</sup> | Most<br>Important | Second<br>Most<br>Important | Third<br>Most<br>Important | Fourth<br>Most<br>Important | Fifth<br>Most<br>Important |
|---|-------------------|-----------------------------|----------------------------|-----------------------------|----------------------------|
| А                                       | 11.5              | 27.2                        | 18.2                       | 16.5                        | 7.8                        |
| В                                       | 68.6              | 17.9                        | 4.5                        | 4.2                         | 0.8                        |
| С                                       | 0.3               | 0.3                         | 3.6                        | 2.2                         | 5.3                        |
| D                                       | 1.4               | 1.7                         | 12.0                       | 12.9                        | 17.9                       |
| E                                       | 3.9               | 12.3                        | 9.8                        | 12.9                        | 17.6                       |
| F                                       | 7.8               | 22.1                        | 28.3                       | 22.7                        | 10.1                       |
| G                                       | 0.3               | 1.7                         | 3.6                        | 8.7                         | 18.5                       |
| Н                                       | 6.2               | 16.8                        | 19.9                       | 19.9                        | 21.6                       |
| Total                                   | 100%              | 100%                        | 100%                       | 100%                        | 99.6%                      |
|   |                   |                             |                            |                             |                            |

<sup>a</sup> A indicates quality of treatment results according to previous patients and their families; B, quality of previous treatment results according to you (the dentist); C, distance of orthodontic office from your office; D, distance of orthodontic office from the patient's home; E, reputation of the orthodontist; F, level of previous patients' overall satisfaction with the orthodontic experience; G, cost; H, level of communication between you and the orthodontist.

the respondents felt that a patient's overall satisfaction with the orthodontic experience was more important.

The respondents also were asked to pick five statements from a list of eight and rank them in order of importance (Table 2). This section of the survey was included to investigate further the factors related to general dentists' referrals for orthodontic treatment. The results presented in Table 2 indicate that the most important characteristics for general dentists, when referring patients to an orthodontist, include the quality of previous treatment results according to the responding dentist and the quality of treatment results according to previous patients and their families. In addition to the evaluations of quality, the overall satisfaction of previous patients with the orthodontic experience and the level of communication with the orthodontists were ranked as important characteristics (Table 2).

#### **Occlusal/Functional Characteristics**

The respondents were asked to indicate the importance of 16 characteristics when evaluating postorthodontic occlusions (Table 3). More than 50% of the respondents indicated canine guidance during mandibular excursions, Class I canines, and absence of balancing (nonworking) interferences as strongly important. Conversely, fewer than 20% of the respon-

Table 3. Frequency and Number of Responses from General Dentists, Stratified on the "Strongly Important" Response

|  |            |            | 3 Neither   |             |             |
|--|------------|------------|-------------|-------------|-------------|
|  |            |            | Unimportant |             |             |
|  | 5 Strongly | 4 Somewhat | Nor         | 2 Somewhat  | 1 Strongly  |
| Question   | Important  | Important  | Important   | Unimportant | Unimportant |
| Canine guidance during mandibular excursions                               | 205        | 117        | 28          | 1           | 6           |
|  | 57.40%     | 32.80%     | 7.80%       | 0.30%       | 1.70%       |
| Absence of balancing (nonworking) interferences                            | 198        | 102        | 42          | 9           | 6           |
|  | 55.50%     | 28.60%     | 11.80%      | 2.50%       | 1.70%       |
| Class I canines  | 192        | 137        | 20          | 2           | 6           |
|  | 53.80%     | 38.40%     | 5.60%       | 0.60%       | 1.70%       |
| Even contact of all teeth in centric occlusion                             | 174        | 147        | 19          | 12          | 5           |
|  | 48.70%     | 41.20%     | 5.30%       | 3.40%       | 1.40%       |
| Class I molars   | 143        | 160        | 38          | 7           | 9           |
|  | 40.10%     | 44.80%     | 10.60%      | 2.00%       | 2.50%       |
| Absence of second molar crossbite  | 129        | 133        | 70          | 19          | 6           |
|  | 36.10%     | 37.30%     | 19.60%      | 5.30%       | 1.70%       |
| Absence of rotations   | 128        | 151        | 66          | 8           | 4           |
|  | 35.90%     | 42.30%     | 18.50%      | 2.20%       | 1.10%       |
| Absence of spacing   | 119        | 168        | 51          | 16          | 3           |
|  | 33.30%     | 47.10%     | 14.30%      | 4.50%       | 0.80%       |
| Amount of overbite   | 116        | 202        | 31          | 4           | 4           |
|  | 32.50%     | 56.60%     | 8.70%       | 1.10%       | 1.10%       |
| Amount of overjet  | 108        | 207        | 35          | 3           | 4           |
|  | 30.30%     | 58.00%     | 9.80%       | 0.80%       | 1.10%       |
| Condylar position coincident in centric occlusion and centric relation     | 103        | 112        | 90          | 37          | 15          |
|  | 28.90%     | 31.40%     | 25.20%      | 10.40%      | 4.20%       |
| Slight disocclusion (light contact between upper and lower anterior teeth) | 84         | 153        | 75          | 24          | 21          |
|  | 23.50%     | 42.90%     | 21.00%      | 6.70%       | 5.90%       |
| Parallelism of roots (radiographically)                                    | 72         | 175        | 67          | 30          | 13          |
|  | 20.20%     | 49.00%     | 18.80%      | 8.40%       | 3.60%       |
| Level curve of Spee  | 53         | 178        | 96          | 20          | 10          |
|  | 14.80%     | 49.90%     | 26.90%      | 5.60%       | 2.80%       |
| Group function during mandibular excursions                                | 48         | 118        | 93          | 48          | 50          |
|  | 13.40%     | 33.10%     | 26.10%      | 13.40%      | 14.00%      |
| Tooth color  | 43         | 92         | 152         | 30          | 40          |
|  | 12.00%     | 25.80%     | 42.60%      | 8.40%       | 11.20%      |

dents considered a level curve of Spee, group function during mandibular excursions, and tooth color as strongly important.

The respondents also were asked to rank the five most important characteristics they looked for when evaluating postorthodontic occlusions from the list of 16 options (Table 4). Canine guidance was ranked first and second most important by a majority (65%) of respondents, followed by Class I molar relationships (ranked first and second by 59.5%) and Class I canine relationships (ranked first and second by 57.1%). Fewer respondents ranked other characteristics highly, such as amount of overbite, absence of rotations, and absence of second molar crossbite (Table 4).

#### Nonocclusal/Functional Characteristics

The respondents were asked to rank four nonocclusal or functionally related characteristics in order of importance. One method of visualizing how the respondents ranked the nonocclusal/functional characteristics is to determine how often each characteristic was ranked first, second, third, and fourth most important by the respondents. For example, the first characteristic, the absence of decalcification, was ranked first 32% of the time, second 29% of the time, third 29% of the time, and fourth 10% of the time. The absence of gingival defects was ranked first by 18% of the respondents. The patient's profile was ranked first by 47% of the responders, and the presence of fixed lingual retainers was ranked first by only 5% of the respondents (Table 5).

### DISCUSSION

A primary focus of this paper was to determine the motivating factors underlying the decision of a general dentist to refer a patient to one orthodontist over another. Whereas some previous papers reported that both the quality of the orthodontic result and a high degree of satisfaction of patients and their families with the orthodontic experience are important,<sup>1–3</sup> none of these studies showed which was more important. The findings of the present study indicate that most den-

| Table 4. | Percentage of | Appearance of | Each Occlusal | Characteristic in | Each | Ranking |
|----------|---------------|---------------|---------------|-------------------|------|---------|
|----------|---------------|---------------|---------------|-------------------|------|---------|

| Occlusal Characteristic                              | Rank 1 | Rank 2 | Rank 3 | Rank 4 | Rank 5 |
|--|--------|--------|--------|--------|--------|
| Class I molars                                       | 40.5%  | 19.0%  | 14.1%  | 14.1%  | 12.3%  |
| Canine guidance                                      | 38.1%  | 27.1%  | 21.0%  | 6.7%   | 7.1%   |
| Centric occlusion coincident with centric relation   | 35.1%  | 19.8%  | 18.9%  | 13.5%  | 12.6%  |
| Class I canines                                      | 22.3%  | 34.8%  | 14.6%  | 14.6%  | 13.3%  |
| Even contact of all teeth in centric occlusion       | 22.0%  | 20.5%  | 19.0%  | 24.4%  | 14.1%  |
| Group function during mandibular excursions          | 20.0%  | 16.0%  | 16.0%  | 28.0%  | 20.0%  |
| Absence of spacing                                   | 17.4%  | 15.9%  | 15.9%  | 24.2%  | 26.5%  |
| Amount of overjet                                    | 11.2%  | 24.8%  | 22.4%  | 24%    | 17.6%  |
| Parallelism of roots                                 | 9.9%   | 12.7%  | 25.4%  | 28.2%  | 23.9%  |
| Absence of second molar crossbite                    | 9.8%   | 8.2%   | 26.2%  | 19.7%  | 36.1%  |
| No balancing interferences                           | 9.7%   | 16.2%  | 25.3%  | 24.7%  | 24.0%  |
| Absence of rotations                                 | 7.2%   | 20.3%  | 21.7%  | 27.5%  | 23.2%  |
| Light contact between upper and lower anterior teeth | 4.4%   | 20.6%  | 25%    | 26.5%  | 23.5%  |
| Amount of overbite                                   | 4.4%   | 14.7%  | 27.2%  | 26.5%  | 27.2%  |
| Level curve of Spee                                  | 2.4%   | 7.3%   | 9.8%   | 19.5%  | 61.0%  |
| Tooth color  | 3.7%   | 0.0%   | 11.1%  | 18.5%  | 66.7%  |

| Table 5.    | Ranking of Nonocclusal or Nonfunctional Char | acteristics |
|-------------|--|-------------|
| (in the Ord | ler of Most Important to Least Important)    |             |

| Nonocclusal or Nonfunctional        | Rank | Rank | Rank | Rank |
|-------------------------------------|------|------|------|------|
| Characteristic                      | 1    | 2    | 3    | 4    |
| Patient profile                     | 47%  | 17%  | 25%  | 11%  |
| Absence of decalcification          | 32%  | 29%  | 29%  | 10%  |
| Absence of ginginal defects         | 18%  | 43%  | 31%  | 8%   |
| Presence of fixed lingual retainers | 5%   | 10%  | 15%  | 70%  |

tists (75%) feel that, overall, they are equally important. Interestingly, there was a slightly higher number of general dentists who felt that the quality of their patient's occlusal and functional orthodontic outcome was more important (18%), whereas only 7% valued patient and parental satisfaction more highly.

Whereas the majority of general dentists responded that patient satisfaction with their orthodontic treatment is of equal importance to the outcome of treatment of previous patients by the orthodontist, we sought to delve into this issue further by asking about other factors related to the orthodontic referral, such as office location, reputation of the orthodontist, cost, and level of communication among practitioners (Table 2). The vast majority of respondents (69%) ranked "guality of previous treatment results according to you (the dentist)" as the most important factor when referring patients to an orthodontist. This finding indicates that although patient satisfaction and occlusal/functional outcome are equally important to general dentists when evaluating postorthodontic occlusions, the occlusal/ functional orthodontic outcome is more important when the dentist himself or herself is making the referral decision.

Another focus of this study was to understand how general dentists assess the "quality" of orthodontic treatment outcomes and what criteria are being used for their evaluation. To our knowledge, this is the first study to investigate the evaluation criteria of general dentists on the quality of an orthodontic treatment outcome. When the respondents were asked to choose five characteristics of a postorthodontic occlusion from a list of 16 characteristics and rank them in order of importance, the respondents chose four characteristics of the treated occlusion most frequently: canine guidance during mandibular excursions, the absence of balancing interferences, Class I canine relationships, and even contact of all teeth in centric occlusion (Table 3).

These findings suggest that general dentists place a high value on canine guidance during mandibular excursions when evaluating postorthodontic occlusions. This characteristic, however, is not part of Andrews' six keys of optimal occlusion<sup>11,12</sup> or one of the criteria used by the Directors of the American Board of Orthodontics (ABO) to evaluate postorthodontic occlusions.<sup>13</sup> Perhaps this contradictory observation is because both Andrews and the ABO directors use only static dental casts and radiographs to evaluate occlusions. Dentists, however, may have the patient in their dental chair and actually watch the patient move through mandibular excursions.

General dentists are exposed to many different sources of information during dental school and subsequently in continuing dental education courses that express the importance of Class I canine relationships and canine-guided occlusion.<sup>14–16</sup> There are a few proprietary schools emphasizing that if canine-guided occlusion is not present, many negative effects can result, including abnormal wear of posterior teeth, temporomandibular dysfunction, and the development of masticatory muscle pain.<sup>17,18</sup> It is possible that the opinions of the respondents in this study concerning canine-guided occlusion have been influenced in dental school and thereafter by these independent dental education centers and other continuing education experiences that stress the importance of canine-guided occlusion.

Other occlusal characteristics that general dentists indicated as important when evaluating postorthodontic occlusions that are part of the ABO criteria13 and part of Andrews' six keys11,12 are Class I canines and Class I molars. The characteristic of "even contact of all teeth in centric occlusion" also was indicated as an important occlusal characteristic by the general dentists, but this appears only in the ABO's list of criteria. This finding suggests that there should be more communication between orthodontists and general dentists over the criteria for evaluating the clinical outcome of orthodontic treatments. Orthodontic education in dental schools, as well as continuing dental education after dental school, needs to be focused on more standardized criteria for evaluation of the outcome of orthodontic treatment.

Although a small percentage of the respondents ranked condylar position as most important, the results of this study show that the majority of general dentists did not indicate the position of the condyle as an important postorthodontic evaluation characteristic that general dentists evaluate. "Gnathologists" and "functional orthodontists" are two of the most prominent groups critical of traditional orthodontic treatment-interestingly with contradictory paradigms. Gnathologists state that if the mandibular condyle is not in a posterior position during maximum dental intercuspation, temporomandibular disorders will ensue.<sup>19-22</sup> On the other hand, so-called "functional orthodontists" argue that seating the condyle posteriorly in the glenoid fossa will be detrimental to the health of the temporomandibular joint.23 The results of the current study indicate that the typical general practitioner is not in either philosophical camp, with only 29% of the respondents choosing condylar position as strongly important.

When the respondents were asked to rank four nonocclusal or functionally related characteristics in order of importance, respondents ranked the patient's profile as most important 47% of the time-more often than the other three characteristics under consideration. This finding indicates that general dentists highly value a patient's profile. Orthodontists also value profiles, relying heavily on pretreatment profile photographs to accurately measure several characteristics of a patient's profile. Determination of whether the jaws are positioned proportionately in the anteroposterior plane of space, evaluation of lip posture and incisor prominence, and the assessment of vertical facial proportions and mandibular plane angle are the three main goals in the orthodontic profile analysis.<sup>24</sup> By understanding the measurements of a patient's pretreatment profile, orthodontists formulate treatment plans to maintain or improve profile features during and after orthodontic treatment.

Thus, the decision of the general dentist to refer a patient to one orthodontist over another is based on a number of interactive factors. It behooves the orthodontic clinician to provide high-quality treatment, to interact well with patients and their families, and to maintain good communications with the general practitioners in the community.

### CONCLUSIONS

- Seventy-five percent of the respondents felt that the occlusion/functional result and patient satisfaction are equally important, 7% felt that patient satisfaction is most important, and 18% of the respondents felt that occlusion and function are most important.
- When looking at the characteristics of the orthodontic referral in greater detail, the quality of previous orthodontic treatment outcomes as judged by the dentist herself or himself was the most important component of the referral decision.
- The majority of the respondents ranked canine guidance during mandibular excursions as most important. Other occlusal/functional characteristics that were considered strongly important were Class I molar and canine relationships, even contact of all teeth in centric occlusion, and absence of balancing interferences.

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