

PDF hosted at the Radboud Repository of the Radboud University Nijmegen

The following full text is a publisher's version.

For additional information about this publication click this link.

<http://hdl.handle.net/2066/24710>

Please be advised that this information was generated on 2019-11-16 and may be subject to change.

Profiloplasty: variations in personal views

H. P. M. Freihofner, R. E. C. M. Mooren

Department of Oral and Maxillofacial Surgery (Head: Prof. H. P. M. Freihofner MD, DMD, PhD),
University Hospital Nijmegen, The Netherlands

SUMMARY. There is sometimes controversy among colleagues over treatment plans in orthognathic surgery. This is because there are differing ideas about which part of the facial skeleton should be moved to give an optimal result. A study was therefore set up to obtain insight into the differences between surgeons.

Ten unbalanced profile drawings were given to seven experienced surgeons with the request that they draw the profile line which they would like to give these patients. It was acceptable either to draw the profiles 'artistically' off the cuff or to use additional construction lines as long as this was not the profile planning according to *Brons and Mulié (1993)*.

The evaluation showed that some surgeons drew profiles which resembled each other to some extent in proportions and inclinations, while others produced variations without any evident regularity and basic concept. The variability per profile was very important in almost all cases. Such discrepancies are not acceptable in a teaching centre.

INTRODUCTION

When considering a change in the profile of a patient, the first step is the decision as to how the profile should be modified. A drawing is made (with or without the aid of a computer), which will show the changes which should be obtained. We call it the 'aimed-at profile line'. This profile line gives the patient an idea of what we would like to achieve. It will indicate which parts should be moved and to what extent.

This step has an artistic aspect, although general rules about the proportions of the different parts of the face are available. The best known are the facial thirds, as proposed by *Leonardo da Vinci*. However, this, even in combination with indications about the inclination of the lower third of the face, is not sufficient for an unequivocal definition as, even then, one could prefer (for example) an advancement of the maxilla, while another could favour a retro-displacement of the lower jaw. An additional genioplasty, more or less pronounced, could add to the variability of the propositions.

If a single individual is responsible for the treatment, this aspect will probably not be of paramount importance. However, if an orthodontist and a surgeon are involved, discussions may arise and in a teaching hospital real disagreement may occur. For a young professional trainee, it could be confusing if no *unité de doctrine* is seen.

We therefore wished to study whether surgeons have recognizable patterns when they draw aimed-at profiles. Furthermore, we tested the extent to which surgeons have basically the same ideas on the correction of a given profile.

MATERIALS AND METHODS

Ten different, rather obviously deviating, profile lines (Fig. 1) were chosen and given in natural size to the seven senior surgeons of the department. They were asked to draw the profile lines of the lower third of the face which they would like to give to these patients. No changes to the forehead and the nose should be proposed. It was permissible to draw them 'artistically' off the cuff or to use some construction with reference lines, etc. as long as it was not a treatment proposition based on the facial analysis of *Brons (Brons and Mulié, 1993)*, which would probably have restricted them too much.

The profile lines were then analysed in two ways. The ten profiles of one surgeon were compared, as to variations, for several measurements (Fig. 2). Accordingly, the seven lines drawn by different surgeons for one patient were compared.

RESULTS

Variations in drawings of one surgeon

The range in length of the upper lip was considerable. The most uniform measured 17.0–21.0 mm but the most variable measured 19.5–29.0 mm (Fig. 3), a variation of 4.0 and 9.5 mm, respectively. The range in depth of the mandible, on the other hand, was quite uniform, 13–17 mm (Fig. 4), but there was a difference of almost a centimetre between the one with the shortest (37–52 mm) and the one with the deepest mandibles (47–60 mm). The total height of

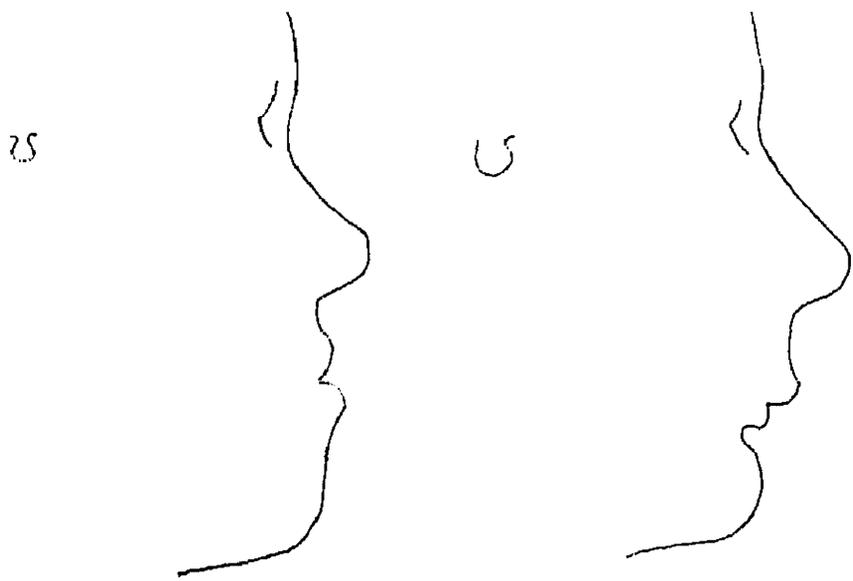


Fig. 1 – Two examples of the full-size profiles which were given to the surgeons.

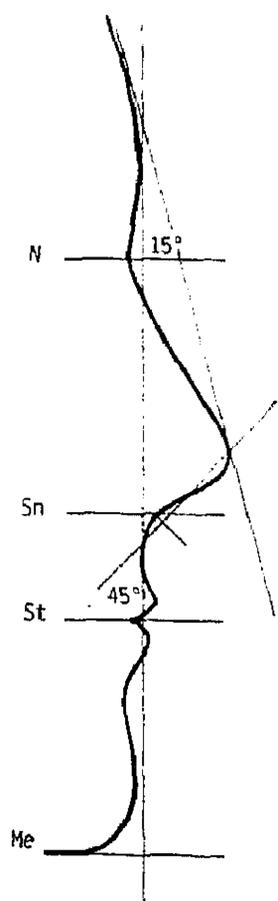


Fig. 2 – Points of reference for evaluation. The points are defined according to the technique of *Brons and Mulié* (1993).

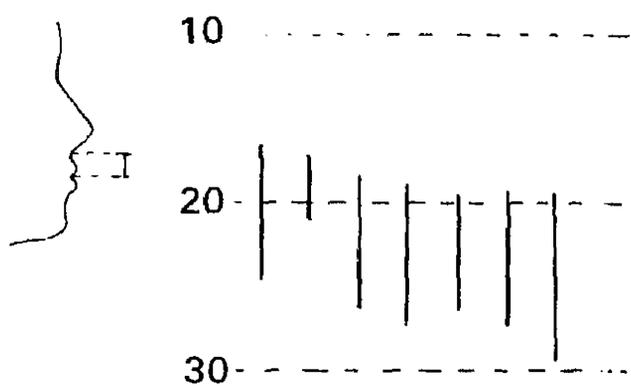


Fig. 3 – Differences between surgeons concerning the length of the upper lip.

the lower third of the face shows a comparable pattern with the mandible (Fig. 5), with ranges between 14.5 and 19.5 mm. While the ranges for the surgeons are again rather homogenous, the absolute measurements differ considerably.

These variations explain the wide range of ratios of the upper-lip length to lower-jaw height (Fig. 6). The most compact range for one surgeon is 0.50–0.37 while, at the other end of the scale, we have 0.70–0.40.

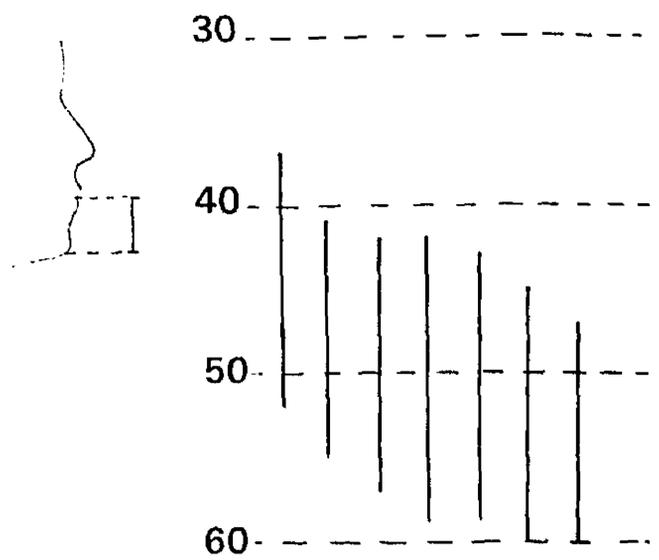


Fig. 4 – Differences between surgeons concerning the mandibular height.

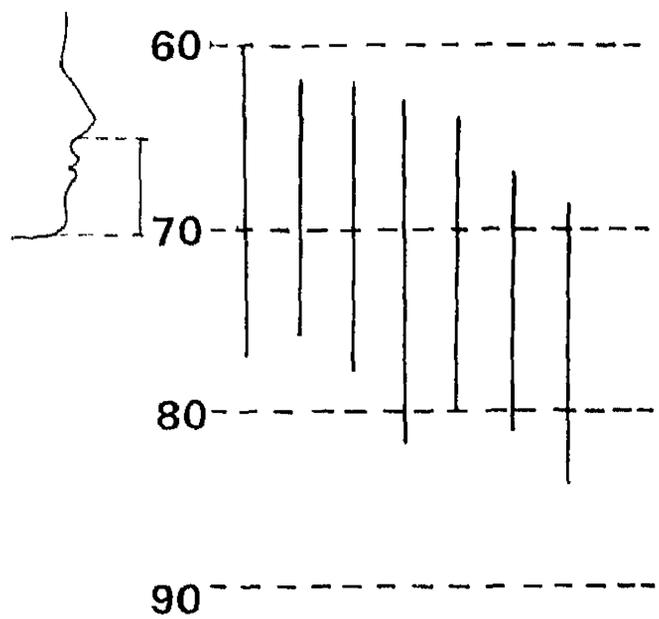


Fig. 5 – Differences between surgeons for the total height of the lower third of the face.

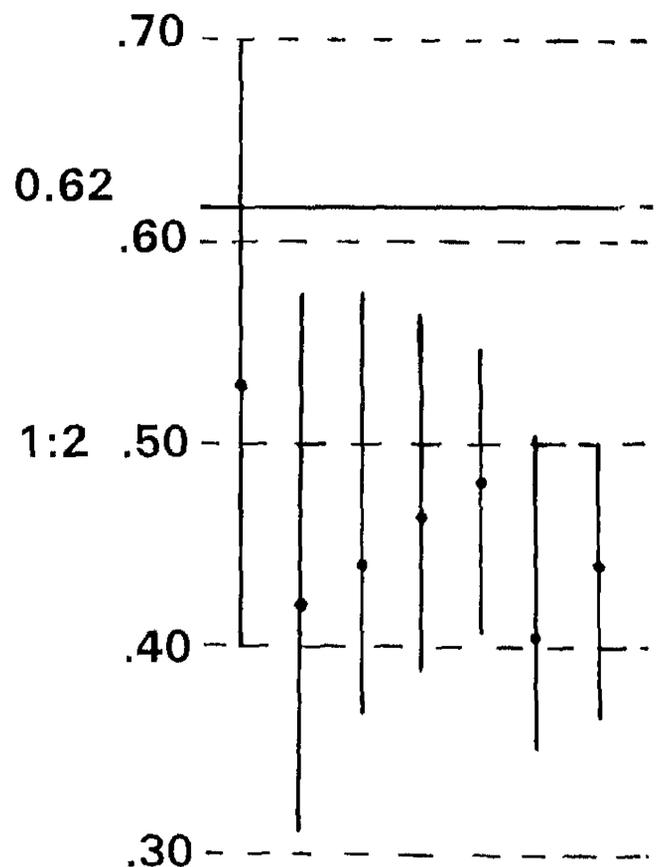


Fig. 6 – Ratios of upper-lip length to mandibular height with mean value (dot) per surgeon. 0.62 stands for the golden section.

Even more interesting are the means which tend most evidently towards low figures, meaning deep mandibles compared with the upper lip. Only one is within 0.53 above the ratio of 1:2, while all others vary between 0.41 and 0.48.

Finally, the inclinations of the lower third with respect to a vertical line again display a good deal of variation (Fig. 7). The most prominent chin protruded $+13.0^\circ$, the most receding chin measured -18.0° . The narrowest range was 8.0° , the widest 20.0° .

Furthermore, the following tendencies were observed. For two surgeons, there was an evident connection between the height of the lower third and the position of the profile with respect to the cranial base (Fig. 8); the higher the face, the further forward the profile line. For four surgeons, it could be shown that the further forward the profile line is positioned, the steeper becomes the inclination of the lower third (Fig. 9).

When summarizing these findings, it is not surprising that one surgeon has a tendency to draw almost the same profile every time, while another has tremendous variations with practically no detectable guidelines (Fig. 10).

Variations in drawings per patient profile

Similar observations can be made when comparing the proposed profiles for each case. The differences between the lengths of the upper lip are considerable (Fig. 11). The most uniform ranged between 21.0 and 23.0 mm, a difference of only 2 mm for all seven surgeons, while the other extreme was 16.5–29.0 mm, a 12.5 mm difference. The lower jaws were, generally

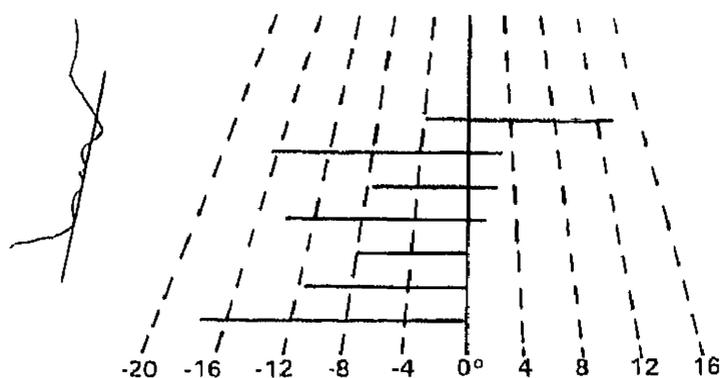


Fig. 7 – Inclinations of lower thirds per surgeon.

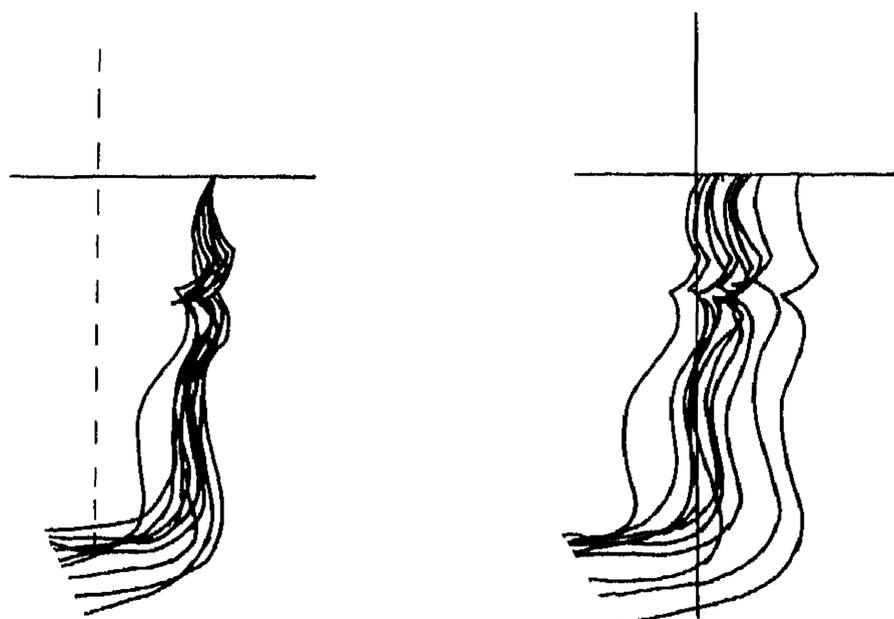


Fig. 8 – Profile lines of one surgeon superimposed on Sn (left) and on the natural vertical through N (right) demonstrating bigger faces when the profile line is positioned further forward.

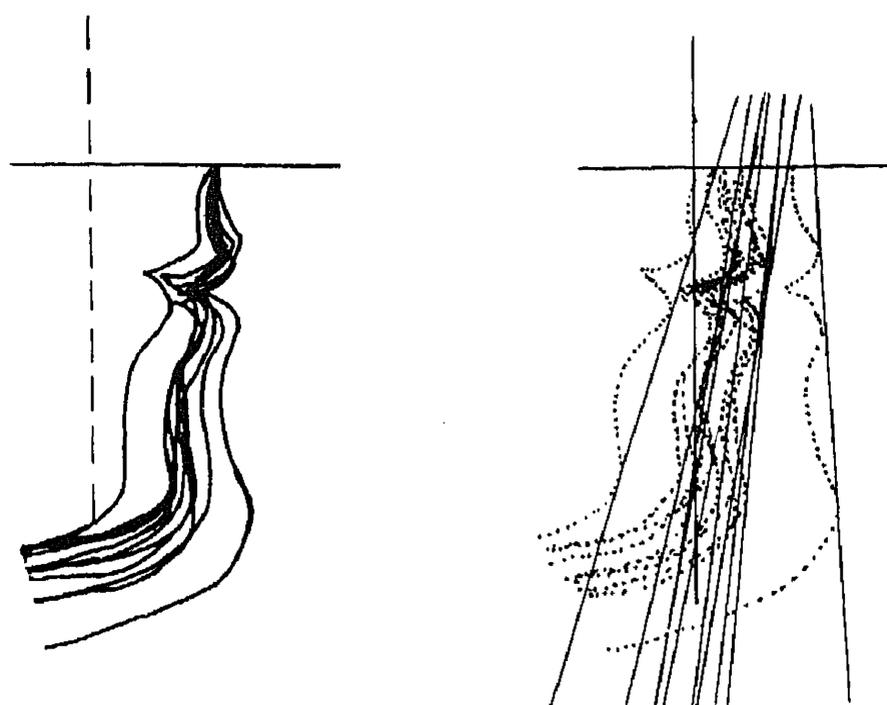


Fig. 9 – Profile lines of one surgeon superimposed on Sn (left) and on the natural vertical through N (right), demonstrating steeper inclinations of the lower facial third when the profile line is positioned further forward.

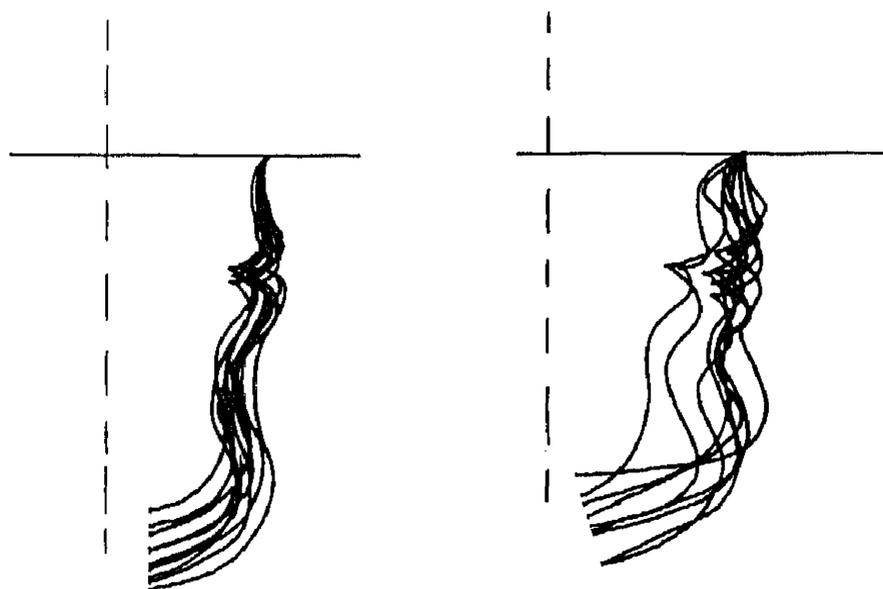


Fig. 10 – Examples of profile lines: (left) those of the surgeon with the most uniformity, (right) those with the most important variability, superimposed on Sn.



Fig. 11 – Differences in length of the upper lip for 10 profiles.

speaking, more uniform but the smallest range was still 46.0–51.0 mm and the widest, 43.0–57.5 (Fig. 12). The difference in range of the whole lower third are larger than when comparing surgeons, ranging from 7.0 to 19.5 (Fig. 13).

The mean ratios of upper lip to lower jaw was, for nine cases, between 0.41 and 0.50, only one case showing more than 1:2, namely 0.56 (Fig. 14). Here also, the ranges were comparable with one exception, 0.35 to 0.66.

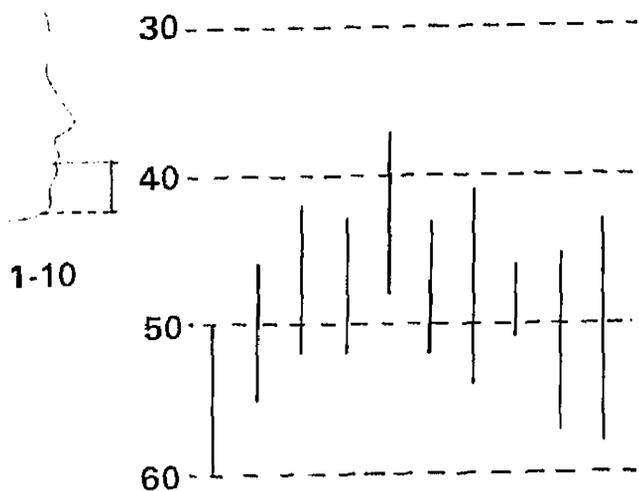


Fig. 12 - Differences in heights of the mandible for the 10 profiles.

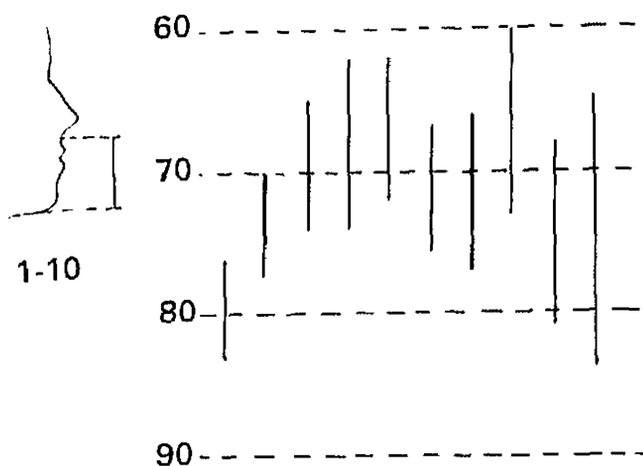


Fig. 13 - Differences in total height of the lower facial third for the 10 profiles.

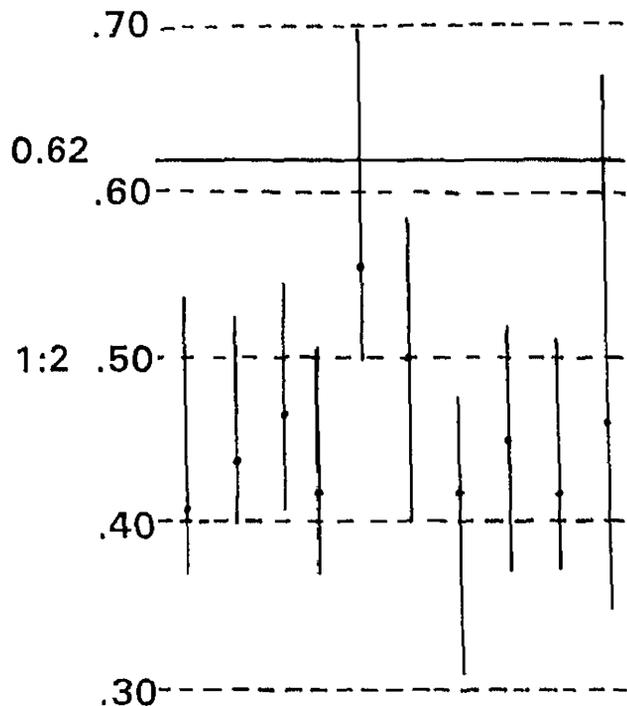


Fig. 14 - Ratios of upper lip length to mandibular height with mean value (dot) for the 10 profiles.

There seem to be cases which are rather easy to correct and in which (more or less) consensus can be seen, as expressed by small ranges; and others which are more difficult, as shown by large ranges and large differences in ratios. However, in one case only, there was general agreement about moving back the mandible and leaving the total lower facial height unchanged. However, in one case also everything was proposed, advancing and retrodisplacing the upper lip and the mandible as well as shortening, lengthening or leaving the lower third unchanged (Fig. 15). The variety of propositions is further demonstrated by Figure 16 which shows extreme choices.

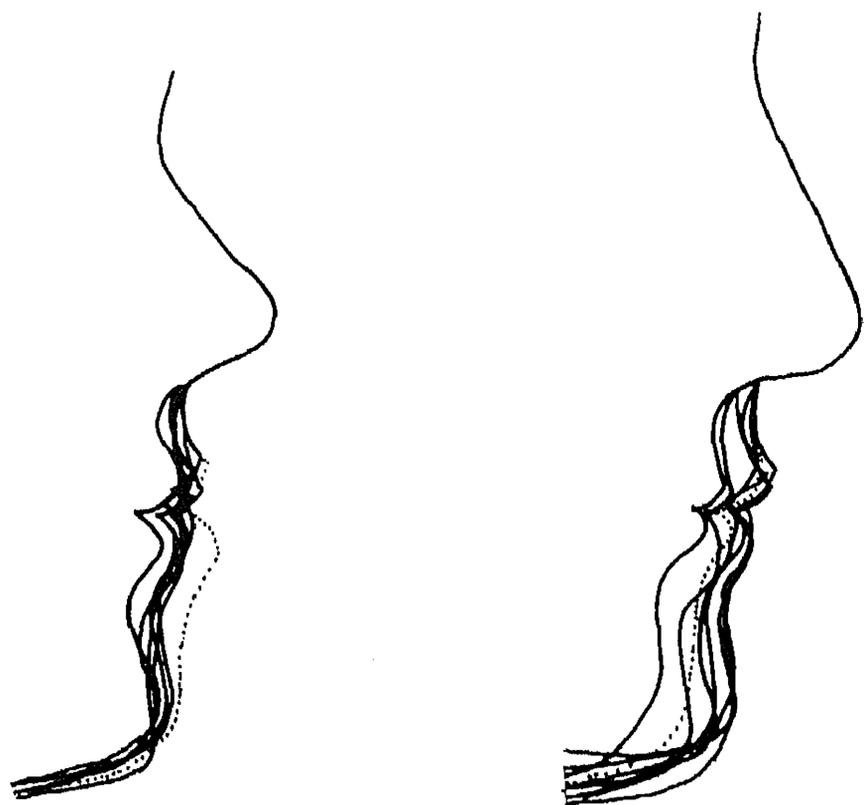


Fig. 15 - Variations in profile lines per profile: (left) the most uniform proposition, (right) the most variation, superimposed on Sn.



Fig. 16 - Variability of aimed-at profiles superimposed on Sn: (left) the seven propositions, (right) the two extremes (the dotted line indicating the starting point).

DISCUSSION

As demonstrated by Figure 16, the changes proposed for correction of a profile are often quite variable. Apparently we must accept that there is very little uniformity in the concept of the ideal profile in this group of surgeons. This is disturbing in those places where several specialists are involved in teaching the same group. More or less well-defined treatment recommendations will not be detected by the trainee.

However, it has to be mentioned that the set-up of this study favoured extreme results. In reality, the choices are less varied as some restricting factors may play an important role. One of them is the fact that some changes can only be realized by complex and technically-difficult operations, while in practice one

tries to normalize the profile with an intervention which is as simple as possible. The other is the occlusion, which will not allow for any movement imaginable but which has to be respected, defining quite clearly the amount of some displacements. This study on paper, on the other hand, allowed for unrestricted freedom of choice.

There are different propositions which should help us to draw a harmonious or 'interesting' profile. One of them is the notion of a straightforward profile line, as proposed by Schwarz (1951), which is today considered to be the most attractive. This was confirmed in this study as three out of four profiles were planned accordingly. Other inclinations are described by Baud (1973) and Bütow (1984) using arcs of a circle from the ear. Lines and Steinhäuser (1981) describe ideal composites of facial angles. These techniques were not analysed further, but interdependent inclinations of the different parts (Brons and Mulié, 1993) will be checked elsewhere.

Vertically, the best known is the rule of facial thirds. The height of the nose (middle third) is equal to the height of the lower third. This rule is found in the work of Leonardo da Vinci and in Dürer. Kirchner (1961) subscribes to it, as did Bütow (1984). However, Baud (1973) and Brons and Mulié (1993) calculate with the ratio of the golden section (1.62:1:0.62) but they use different reference points. The lower third is again divided into several parts. According to Dürer, upper lip and mandibular height have a ratio of 1:3. Just one of the 70 profiles went slightly below that ratio (0.31). For da Vinci, it is basically 1:2. Fifty-two (74%) were drawn with a ratio between 1:3 and 1:2, which indicates that the advice of Kirchner (1961) is sound. She stated that it should be 1:2 or a little less. Only 17 (23%) have a ratio greater than 0.5 and only three (4%) of the drawings have more than 0.62 (which is the golden section and is the mean advice of Brons and Mulié (1993)) for the ratio of upper lip to mandibular height.

The ranges for the different values per surgeon have a wide spread. This may be explained by the variety of head forms to be corrected. Ideally, we would expect that variations are minimal between the propositions for one profile. However, this is most evidently not the case. One might conclude that a drawing of an aimed-at profile does not correspond at all to any scientific approach, which is not surprising.

This evaluation cannot be more than a first step in the analysis of this complex question. Further studies are under way which evaluate the reproducibility of these drawings. Furthermore, they will be analysed using the method of Brons and Mulié (1993) because that system allows for variations in the proportions and also takes into consideration the preservation of the characteristics of the original profile, which seems

to be a unique concept. It is conceivable that a more detailed quantitative analysis will shed more light on possible errors in drawing aimed-at profiles. This will not prevent disappointing end results, as there are some insurmountable obstacles to predicting the outcome (Freihofer, 1991), but at least it would mean that the optimal starting-point for a correction was chosen.

CONCLUSION

The drawings of aimed-at profiles showed more important differences than was anticipated. If it is assumed that each drawing represents the optimal profile-line, the surgeons could imagine it must be accepted that treatment plans of different surgeons cannot become uniform and will be completely dependent on the personal views of the patient and his medical attendant. This would basically mean that one has only to bring the two dental arches into a reasonable relation to each other, and one will then always find somebody who will consider the result obtained optimal, as long as there are no extensive vertical or transverse deviations. However, the authors, being involved with teaching, would prefer if treatment recommendations could be found which on one side tend in the direction of a generally-agreed consensus, without eliminating completely the 'artistic freedom' of the surgeon and personal views of the patient. We hope that the guidelines of Brons and Mulié will prove to be a useful tool towards attaining that goal.

References

- Baud, C. A.: Le calcul de la beauté. Rev. Mens. Suisse Odontostomatol. 83 (1973) 1309
- Brons, R., R. M. Mulié: Faciale harmonie. Smits, Den Haag 1993
- Bütow, K. W.: A lateral photometric analysis for aesthetic-orthognathic treatment. J. Max.-Fac. Surg. 12 (1984) 201-207
- Da Vinci, L.: In: Gonzales-Ulloa, M. Transact. Int. Conf. Oral Surg. Churchill Livingstone, Edinburgh 1970, 8-17
- Dürer, A.: In: Brons R., Mulié R. M. 1993
- Freihofer, H. P. M.: Soft-tissue contours after osteotomies: Predictability and imponderabilities. In: Ousterhout, D. K.: Aesthetic contouring of the face. Little, Brown, Boston, 1991, 117-134
- Kirchner, L.: Die Bedeutung der Gesichtsproportionen für die Wiederherstellungschirurgie. Fortschr. Kiefer-Gesichtschir. 7 (1961) 5-14
- Lines, P. A., E. Steinhäuser: Profilometrics as a new diagnostic aid in the treatment planning of orthognathic surgery. Fortschr. Kiefer-Gesichtschir. 26 (1981) 5-7
- Schwarz, A. M.: Lehrgang der Gebissregulierung. Urban and Schwarzenberg, Wien-Innsbruck 1951
- Prof. H. P. M. Freihofer
Mond- en Kaakchirurgie—421
Academisch Ziekenhuis Nijmegen
Postbus 9101
NL-6500 HB Nijmegen
The Netherlands

Paper received 11 November 1996
Accepted 25 April 1997