Aesthetic guidelines for natural-looking dentures

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_Natural-looking dentures have always been a great challenge for the dental technician or prosthetist. With so many different brands of acrylic tooth systems on the market, it can be easy to overlook the basics of tooth shape and its relation to the physiology of the face.

In this article, I consider the morphology of the anterior teeth in particular. Tooth shapes vary enormously between individuals and to the untrained eye, a system of defining these shapes probably seems remote. However, if you look at the face as a whole, you will very quickly understand how nature constitutes the relationship between tooth shape and facial physiology through human genetic development (Figs. 1–3) This article will help you to identify the corresponding characteristics of tooth shape through a systematic approach suitable for each case.

First of all, it may help to peruse the illustrations in order to understand the system and the connections between the illustrations.

Consider general anterior tooth morphology and you will recognise, in addition to the obvious characteristics, further specific individual features, like the difference between a central incisor and a canine. Although the variety of different shapes of the anterior teeth appears to be immense, this can be quiet deceiving. If one leaves aside the tooth positions and the colour of the tooth, the general morphology consists of two factors (Figs. 4–6):

1. the basic shape of the tooth, i.e. definitive width; and
2. the marginal ridges or line angles of the tooth, which defines the optical width.

This correlation of optical width and definitive width leads to the different shapes of teeth. This morphological variety can be subdivided into three basic principles. These three fundamental archetype shapes are square (athletic), tapering (leptosome) or ovoid (pyknic). All other tooth shapes are considered to be hybrid shapes.

Fig. 1_The triangular tooth shape.
Fig. 2_The rectangular tooth shape.
Fig. 3_The oval tooth shape.
Fig. 4_When looking at the marginal ridges or line angles, the square tooth shape is recognisable.
Fig. 5_When looking at the marginal ridges or line angles, the triangular tooth shape is recognisable.
Fig. 6_When looking at the marginal ridges or line angles, the oval tooth shape is recognisable.

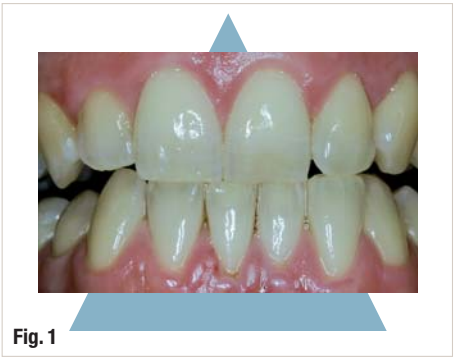
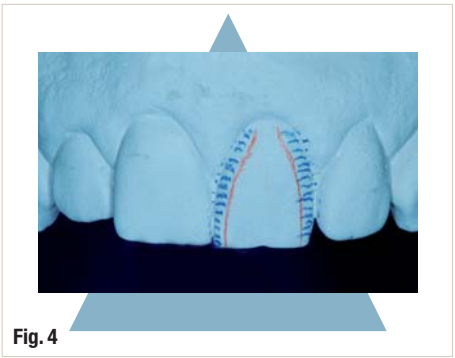


Fig. 1

Fig. 2

Fig. 3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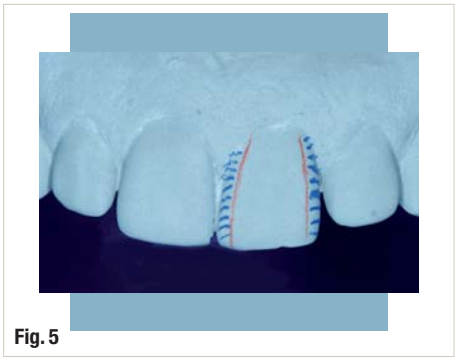
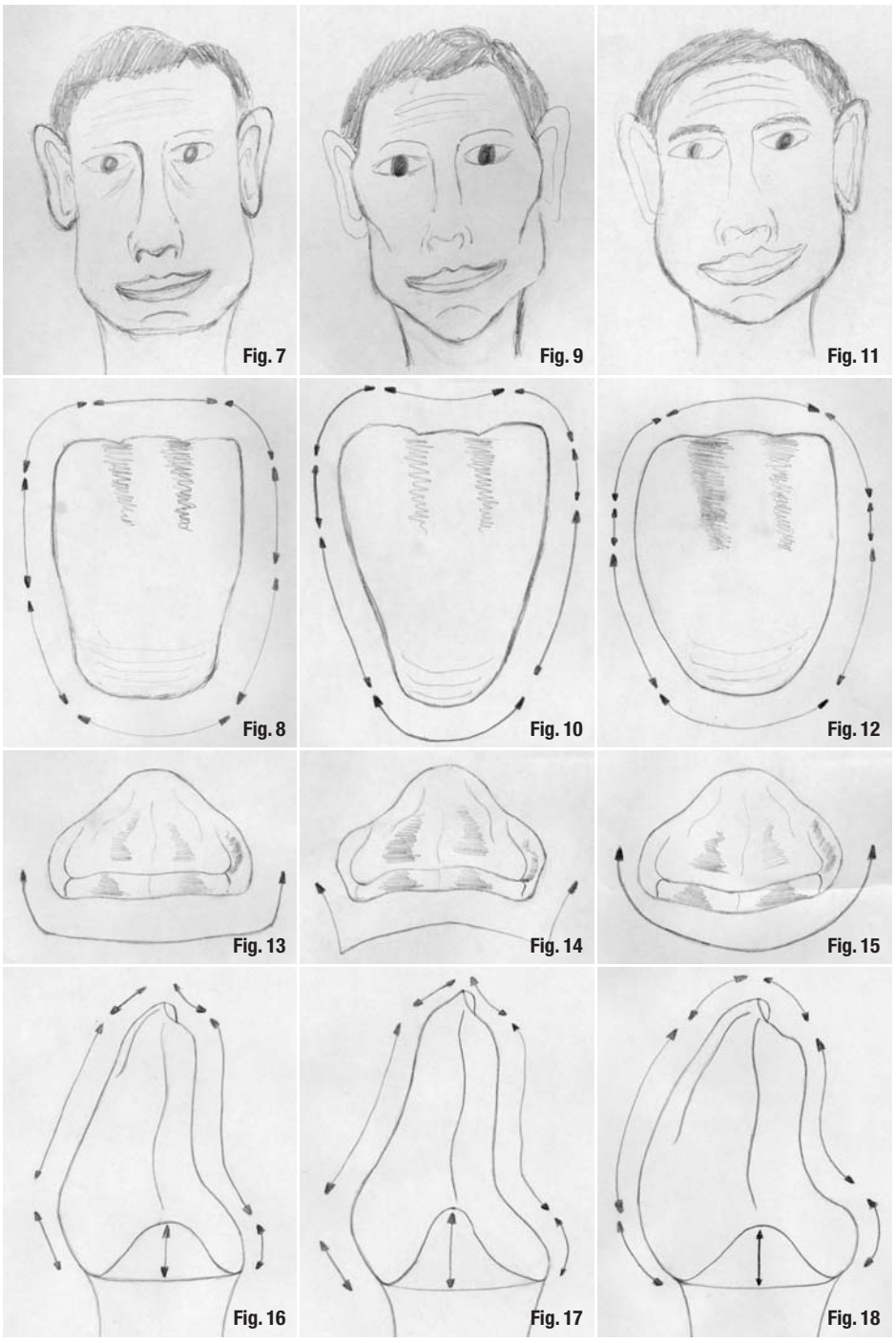


Fig. 5

Fig. 6



Figs. 7 & 8_An athletically built person with an angular face (square). The labial tooth shape resembles the reversed shape of the face.
Figs. 9 & 10_The leptosome tooth shape of a thin or skinny person with the individual characteristics of the marginal ridges.
Figs. 11 & 12_Person with a rounded (ovoid) form of the face (pyknic) and the ovoid tooth shape with the individual characteristics of the marginal ridges.
Fig. 13_Even from the incisal aspect, the respective shape characteristics are visible.
Fig. 14_The triangular type (leptosome) with an introverted labial surface.
Fig. 15_The ovoid type (pyknic) with an extroverted labial surface.
Fig. 16_Detailed characteristics when viewed from the approximal.
Fig. 17_Detailed characteristics of the triangular tooth shape.
Fig. 18_Detailed characteristics of the ovoid tooth shape.

In 1914, Leon Williams suggested a now famous classification system of tooth shape, theorising that these three fundamental shape types are reflected in the "Kretschmeric Construction Types" (facial outline types). The shape of the tooth is equal to the horizontally flipped shape of the face (Figs. 7–18). For example, an athletically built person with an angular face would have square-shaped teeth (Figs. 7, 8, 13 & 16). A thin person with a peaked chin (leptosome) would have triangular-shaped teeth (Figs. 9, 10, 14 & 17).

Today, this classification of the tooth shapes based on the shape of the face is considered to be antiquated. Hence, it only serves as a very rough general guide when selecting a set of anterior acrylic teeth for a patient case. In the fifties, the "dentogenic concept" by Frush and Fisher spread across the US and then to other parts of the world. According to this concept, a "personality spectrum" can also be added to help obtain the shape of the tooth. Next to clinical, intra-oral and facial relation considerations, the age, sex, and other characteristics of the patient are

Fig. 19_Twelve-year-old patient with nicely indented incisal edges.
Fig. 20_Comparison of a 30-year-old patient with abraded incisal edges ...
Fig. 21_... and a 50-year-old patient with strongly worn incisal edges.
Fig. 22_Mandibulary anteriors of a 12-year-old patient with strong mamelons.
Fig. 23_Mandibulary anteriors of a 30-year-old patient.
Fig. 24_A set of lower anteriors with strong occlusal wear facets.

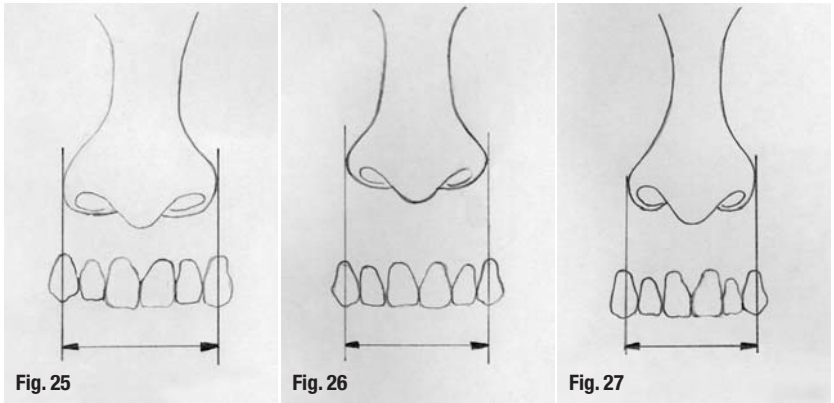
also considered. Today, taking all of these factors into account, one will most likely derive some sort of hybrid shape based on one of the three original basic shapes.

The concept of the three basic shapes with regard to the labial effect of a tooth can be demonstrated when viewed from the incisal perspective. A study by Yammamoto demonstrates this well (Figs. 13–15). From the incisal perspective, the relative flatness of the square shape, the concavity of the triangular shape and the convexity of the ovoid shape is apparent.

Another decisive aspect of a successful natural reproduction is the design of the marginal ridges or line angles, which has an effect on the 3-D appearance of the tooth.

Besides the shape and the width of the tooth crown, the width of the root is also a decisive factor. Up to now, I have restricted the consideration of the tooth to the labial and incisal view. In order to be able to replicate the 3-D appearance of the tooth, we must also consider the labial curvature of the tooth (Figs. 16–18). From this point of view, the incisal triangle features can also be divided into the three basic components. For each individual case, it is then necessary to derive the respective hybrid shape.

Fig. 25_The nose base determines the width of the upper anterior teeth (Gerber).
Fig. 26_The average nose type correlates with the average width of anterior acrylic teeth.
Fig. 27_A narrow nose base is an indication of slender anteriors.



After this has been considered, the following types can be derived from the mesial view:

The oval anatomy type

_The two well-developed labial marginal ridges are the key characteristic feature of this anatomy type.
_A strong labial depression and a wide labial transitional surface are present. The difference between the mesio- and the disto-approximal surface is noticeable. The distal face is wider than the mesial.
_The growth lobes are generally not very prominent with this tooth shape type.

The three-angled anatomy type

_The mesial and distal marginal ridges are again distinct but not as strong as with the oval anatomy type.
_The labial surfaces are relatively wide, without a noticeable difference in width between the mesial and the distal.
_The labial and proximal growth lobes are prominent.

The square anatomy type

_The characteristic feature of this anatomy type is the indistinct marginal ridges, which can sometimes cause a rather plain look.
_A well-developed central marginal ridge is present, which appears quite prominent when viewed from the incisal edge.
_The labial and approximal depressions are somewhat strongly developed, although not as strongly as with the triangular type.

The marginal ridges or line angles develop in the sulcus and run parallel to the basic outer shape of the tooth towards the incisal edge. At the incisal aspect, the progression of the marginal ridges differs between unabraded juvenile teeth and worn aged teeth (Figs. 19–24).

These different morphological characteristics are evident in the case of adjacent teeth, which makes the

Fig. 28

Fig. 29

Fig. 30

Fig. 31

Figs. 28–31_These images show just a few of the many dento-facial varieties that can be found in nature.

reconstruction of a single tooth quite easy. A great deal of information is needed in order to rebuild the shape of a tooth and to recreate a natural, harmonious look. It becomes more complicated when it is necessary to replace the whole anterior segment or the dentition in an entire jaw. For this reason, the knowledge of the anatomical features of the single tooth is very important.

A further aid for determining the definitive width of the teeth is the width of the nose base, which agrees in most cases with the width of the front teeth (Figs. 25–27). In his theory, Gerber suggests, amongst other things, that from an embryo-genetic view the proportion of the nose base and the width of the nose root can be determined (Figs. 28–31).

When it comes to determining the length of the anteriors, some clues can be derived from the age of the patient.

The lip type is of great importance here. In vertical perspective, we distinguish between a full and thin lip and/or between a long and short upper lip (Figs. 32–34). Patients with short upper lips expose more of their teeth than patients with longer upper lips. The lips outline the space that is subdivided by the arrangement of the teeth, which typically determines certain aesthetic key factors. One can achieve harmony with the remaining parts of the oral region by weakening or intensifying the visible tooth areas.

_Conclusion

In this article, I have only paid attention to the upper anteriors. The main reason for this is that the upper anteriors are aesthetically much more significant than the lower anteriors. The different shapes of teeth can be observed on both the upper and lower anteriors from the facial, mesial and distal aspects.

This method for achieving aesthetic harmony can be summarised as:

1. analysis of the facial parts, i.e. face shape type;
2. analysis of the dento-facial parts, i.e. lip–nose type; and
3. analysis of the intra-oral area, i.e. bite situation and remaining dentition._

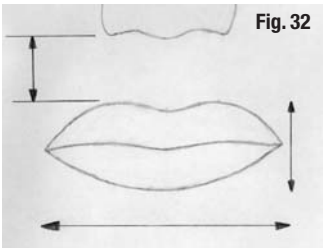


Fig. 32

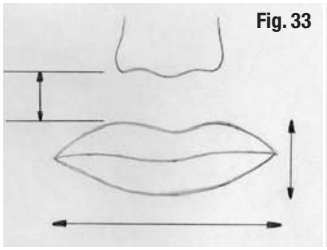


Fig. 33

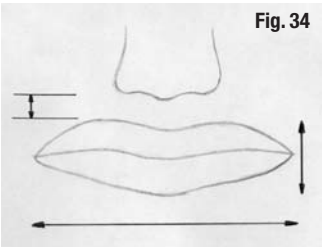


Fig. 34

Fig. 32_Very full lips suggest long upper anteriors.
Fig. 33_The standard lip type.
Fig. 34_The shallow lip type suggests relatively short anteriors. This is also due to the small distance between the nose and the upper lip.

_about the author

cosmetic dentistry

Björn Maier completed an apprenticeship as a precision mechanic in 1995 and subsequently completed an apprenticeship as a dental technician in his parent's dental laboratory in 1999. He then worked in the US, Germany and Switzerland. From 2006 to 2007, he completed the course at the Master School in Stuttgart, Germany, and opened up his own laboratory, Zahntechnik Björn Maier in spring 2007. He also lectures internationally.

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