



PHYSIOLOGY OF SMILE

A DENTIST'S PERSPECTIVE

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It all begins with the smile ...





- A charming smile can open doors and knock down barriers that stand between you and even your worst enemy
- If you feel good about your smile, you are much more likely to flash it on others in a pleasing and perhaps even disarming manner.

Constituents of smile

- Unity
- Dominance
- Symmetry
- Proportions



It does not distinguish....











MYTHS OR FACTS
ABOUT SMILE



- **Myth No. 1: Smiling effects are restricted to Face only.**

Every time you frown, you're unnecessarily exhausting 43 facial muscles, while smiling only uses 12 muscles. Some studies show that beaming can benefit your blood pressure levels. Add a laugh and you'll also slim your middle -- the movement exercises your abs, diaphragm, shoulders and heart. Scientists at Vanderbilt University found that laughing can stoke your calorie burn by up to 20 percent.



- **Myth No. 2: Humans Grin like animals**

One thing that separates us from animals may be our ability to accessorize, but it's also our capacity to smile. We don't learn how to smile from our surroundings; rather, it's a natural mechanism that's hardwired in us from birth. Studies have shown that newborn babies crack their first grin as early as two hours after delivery.

- **Myth No. 3: Men are more cheerful than Women.**





The average woman smiles approximately 62 times a day. In that same day, a man only flashes his pearly whites a mere eight times.

That's probably why we frequently see Cheer Girls and not Cheer boys in various games played across the world...

- 
- **Myth No. 4: Smile cannot be classified into various types; it's just single**

Happiness isn't the only thing we can express when we turn up the corners of our mouths. During his research at the University of California, San Francisco, scientist Paul Ekman discovered that people smile 19 different ways, depending on social situations and emotions, including fear, grief and hatred. All types fall under two larger categories: heartfelt and artificial. You can differentiate the two : Sincere smiles cause the corners of your eyes to scrunch up -- insincere smiles don't.

You know that smile – the self satisfied,
arrogant kind of evil smile – the **SMUG**
SMILE



Half Smile – Half Frown



SMILE ANALYZER




PERSONALITY NATIONALITY PROFESSION

HAPPY	AMERICAN	SALESPERSON
INNOCENT	FRENCH	POLITICIAN
SMUG	RUSSIAN	LAWYER
FRIENDLY	BRITISH	MOVIE STAR
CONFUSED	CANADIAN	DOCTOR
EVIL	GERMAN	MIME



- **Myth No. 5: More Beauty comes from Makeup rather than a smile.**



- 
- When asked to select more attractive counterparts, study participants at Scotland's University of Aberdeen pointed to those people who were beaming. In another recent lab report, 69 percent of those asked said that women look younger and more attractive when they wear a smile rather than makeup.

- **Myth No. 6: Smiling has little correlation with longevity of life.**






- Research conducted at the University of Illinois has suggested that people who generally feel happy and smile more often have a longer life expectancy of nearly a decade. Another study looked at baseball cards. The Wayne State University scientists concluded that those athletes who were flashing their pearly whites in their pictures lived on average seven years longer than those who didn't.

- **Myth No. 7: Smile has nothing to do with married life**



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- People who grin consistently are more likely to have healthy marriages, say researchers at DePauw University in Indiana. Some say it's because smilers can more easily express their emotions, and others think that people who smile often attract happier people, allowing them to form stronger, more positive connections.

- 
- **Myth No. 8: Smiling has no biochemical effects on the body.**


Research shows that the simple act of turning your mouth up, whether authentic or not, can help release endorphins, feel-good hormones. Serotonin, a chemical that's a natural stress-reducer, is also increased when you smile.

- **Myth No. 9: Keep mum and remain isolated when you have cold.**






- Cut down on those sick days by plastering a big, cheesy grin on your face. Every time you flash your teeth, your body produces greater quantities of antibodies and T-cells (or white blood cells), which may give your immune system a huge power boost.


- 
- **Myth No. 10: Smiling is not a disease and hence not contagious.**

During an experiment conducted in Sweden, participants reported that they found it very difficult to frown when they saw other participants who were smiling. Many began to turn their mouths up without even realizing it. Start smiling and the whole world will smile with you.



Can anger also produce
endorphins or a smile?




- 
- A **smile** is a facial expression formed by flexing the muscles near both ends of the mouth and by flexing muscles throughout the mouth. Some smiles include contraction of the muscles at the corner of the eyes .

The facial muscles include:

- Occipitofrontalis
- Temporoparietalis muscle
- Procerus
- Nasalis muscle
- Depressor septi nasi
- Orbicularis oculi
- Corrugator supercilii
- Depressor supercilii
- Auricular muscles
(anterior, superior and posterior)
- Risorius
- Orbicularis oris
- Depressor anguli oris
- Zygomaticus major
- Zygomaticus minor
- Levator labii superioris
- Levator labii superioris alaeque nasi
- Depressor labii inferioris
- Levator anguli oris
- Buccinator
- Mentalis




- 
- The 12 muscles used to make you smile are the Zygomaticus major and minor (4), Orbicularis oculi (2), Levator labii superioris (2), Levator anguli oris (2) and Risorius (2)



Changes in the body during smile

- Researchers have shown how smiling can positively affect several functions, including:
 - Immune system strength
 - Sense of well-being and positive outlook
 - Blood pressure
 - Balance
 - Self-control
 - Resilience against stress

- 
- On a biochemical level, smiling releases *endorphins* and *serotonin*. Endorphins are natural painkillers. The more endorphins your brain releases, the more your body can fight off symptoms of illness.
 - Similarly, serotonin is a brain chemical that acts as a natural anti-depressant. Reshaping our mouth from a frown to a smile literally sparks serotonin, dramatically shifting our sense of well-being from negative to positive.



Why a smile might trigger happiness ?

- When the temperature of any body part changes, the chemical activities connected with that area also change.
-
- Therefore, when facial muscles are activated in an expression, the biochemical processes associated with those areas of the face are altered according to their temperature change.
- And research suggests that a cooler brain creates good emotions, while a warmer brain produces negative emotions



- The internal carotid artery, is the "pipe" that delivers the majority of blood to the brain.
- This artery flows through an opening called the cavernous sinus, which contains lots of facial veins.
- When someone smiles, causing certain facial muscles to stretch and tighten, veins are constricted. This would cut down on the blood flowing to the cavernous sinus, which in turn would reduce the amount of blood flowing through the carotid artery to the brain.




- Less blood volume means the temperature of that blood drops.
- When that cooler blood gets to the brain, brain temperature would drop, too, triggering a happy feeling. The theory works in reverse, when the muscles involved in a frown tighten, the result is increased blood flow to the cavernous sinus and, by extension, a warmer brain.

Duchenne display

- The smile occurring in response to humour is the facial configuration designated ([Ekman *et al.*, 1990](#)) the 'Duchenne display' (in honour of the neurologist, G. B. Duchenne, who first described how this pattern distinguished smiles of enjoyment from other kinds of smiling).




- 
- The Duchenne display refers to the simultaneous contraction of the zygomatic major and orbicularis oculi muscles (which pull the corners of the lips backwards and upwards and narrow the eyes, causing wrinkles).
 - During laughter, additional facial, respiratory and laryngeal muscles are activated ([Bachorowski and Smoski, 2001](#); [Ruch and Ekman, 2001](#)).

0-6 Weeks : Reflexive Smile

- You can spot the newborn's first grin when he's asleep.
- You'll see him twitch, startle, and -- is that a smile?



- 
- During REM sleep the baby's body goes through physiological changes that activate certain reflexes, and one of those is a smile.
 - At this point it's probably just a physical reaction, not an emotional sign.

6-8 Weeks : Responsive Smile

- As the baby grows, they will start to smile at things they find pleasurable -- cuddles, voices, and faces.
- Their smile is a reaction to sensory experiences, not a social response.



2-3 Months: Social Smile

- The baby will smile when he sees parents and will react when they make silly sounds (try mooing, oinking, and beeping).
- The gurgling, the grunting, the strange humming are all attempts by the baby to express himself.



About 9 Months: Selective Smile

- This is the age when your baby starts to know you as special and distinct from other people, but there's a downside to that: Stranger anxiety sets in.
- The formerly friendly baby is likely to stop smiling at strangers.



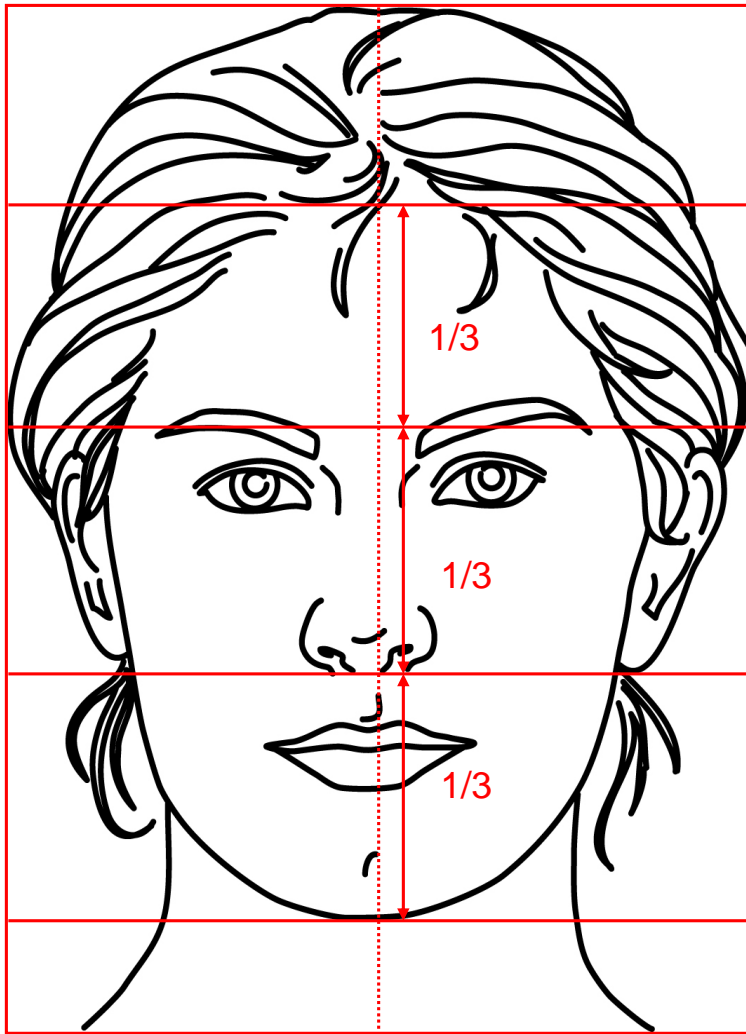
About 12 Months : A Sense of Humor

- As the baby starts to develop language skills, the sense of humor also emerges.
- Surprise is a big element in making babies laugh at 12 months.

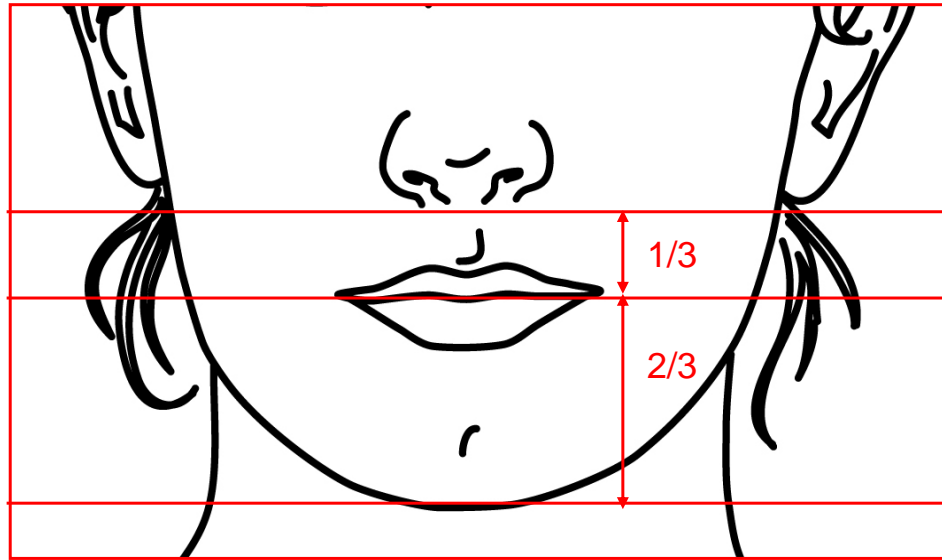


DENTIST'S ROLE

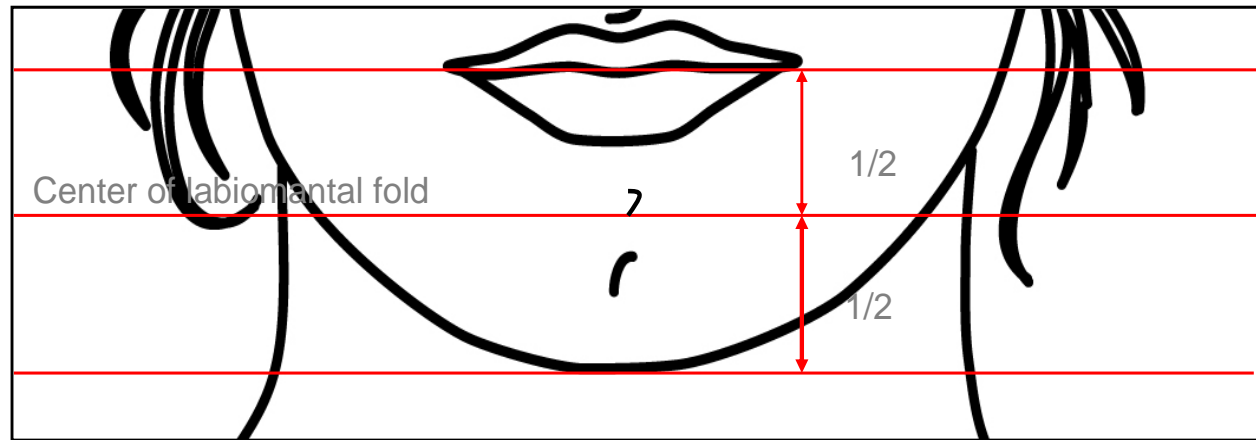




- Face is divided vertically into 1/3
 - Last frown on the forehead to midbrow,
 - Midbrow to subnasale and
 - Subnasale to menton

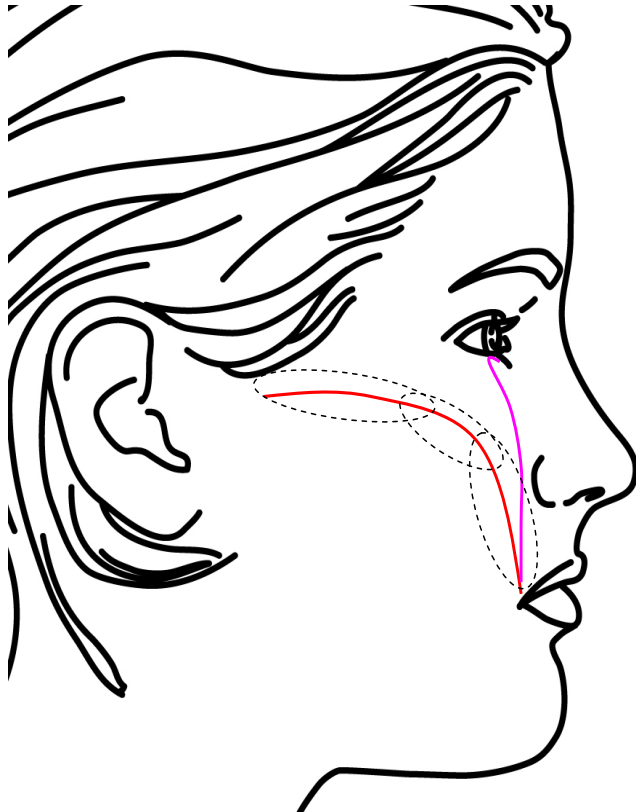


- UPPER LIP LENGTH Sn-OR = 19-22mm
(Short < 18mm)
- LOWER PART - (Li-Me) 40-42mm
FEMALE 42-44mm MALE
- LIP SHOULD BE HALF OF THE LOWER
2/3 (OR-Me)
- THIS SHOULD BE VERIFIED ON THE
CEPH. (LOWER INCISOR - MENTON)



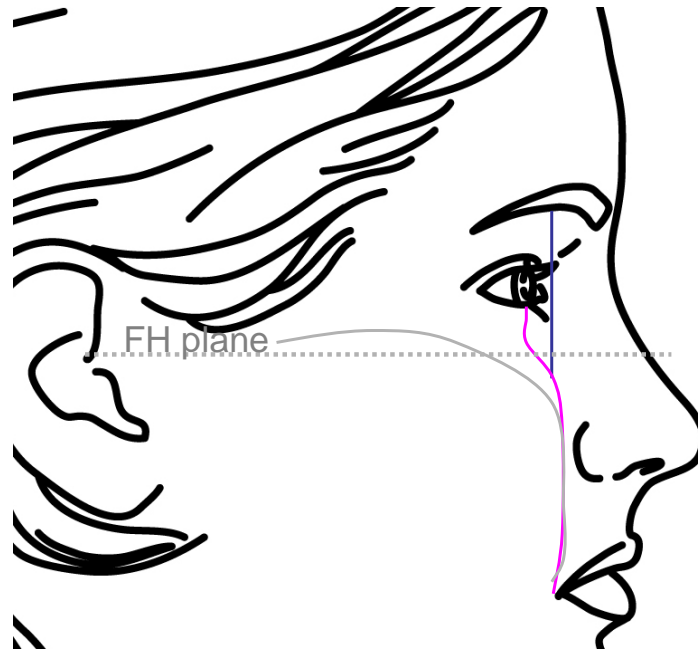
- Rima oris to menton
 - Rima oris to labiomental fold should be half (Lower anterior dentoalveolus)
 - Labiomental fold to menton should be the other half (Chin)

ORBITAL RIM CONTOUR



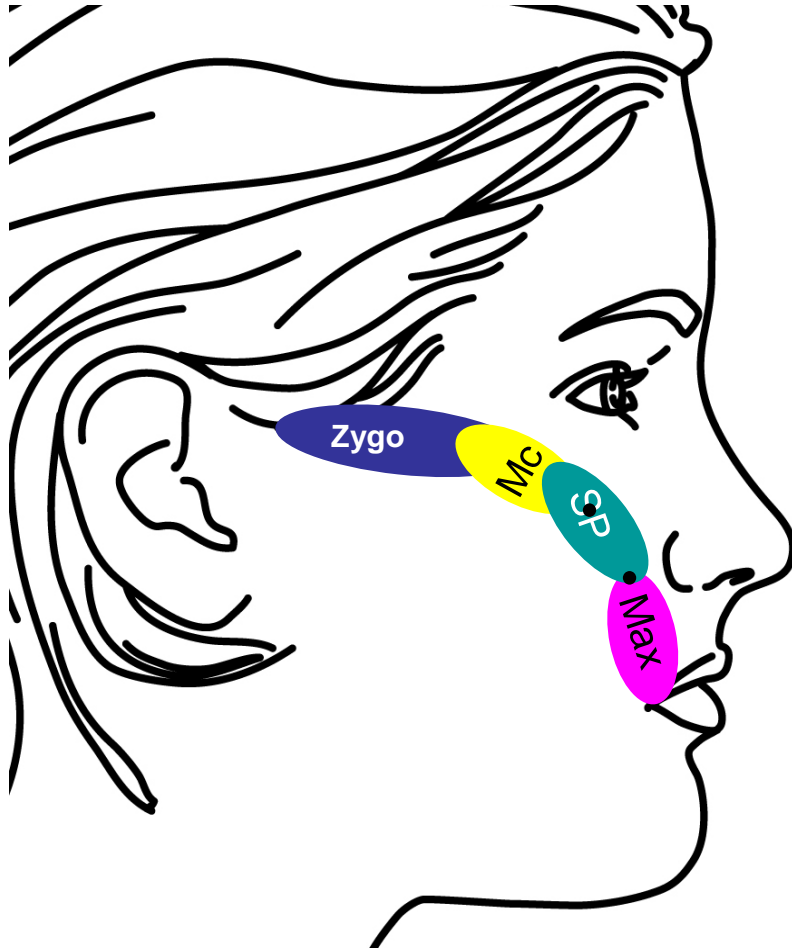
- Definite anatomical prominence of the orbital rim should exist
- Depression should exist below the eyelid
- Prominence of the infraorbital rim should be present
- The above contour should become continuous with the cheek contour laterally and the maxillary contour anteriorly

GLOBAL PROJECTION

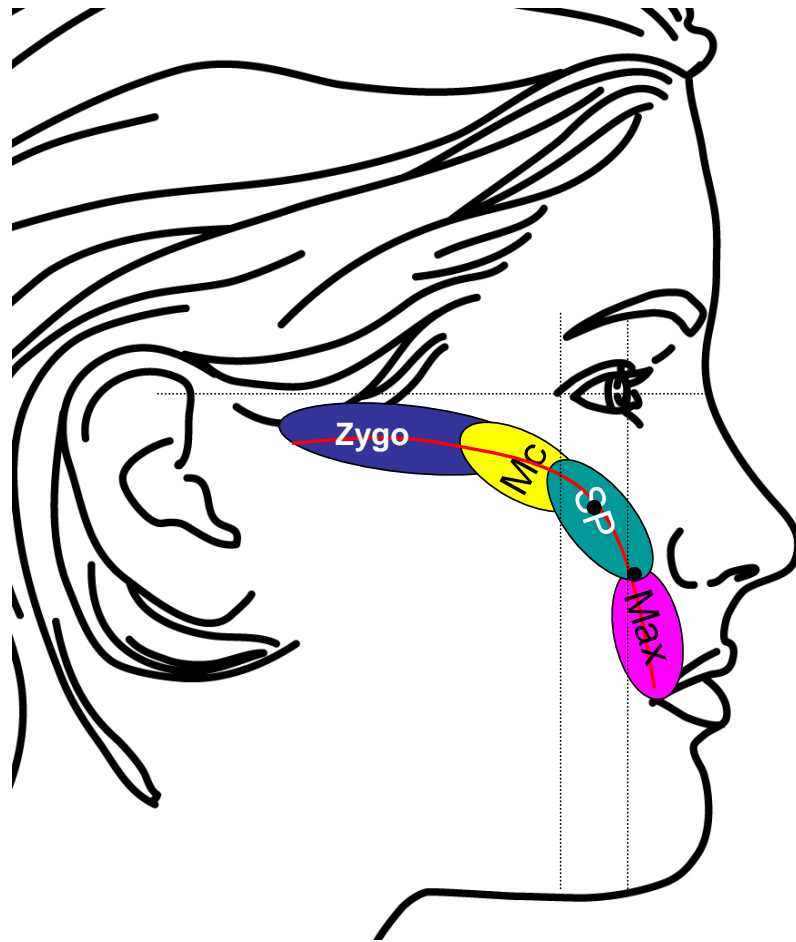


- Perpendicular drawn to Frankfort at infraorbital rim
 - The globe should be contained within this
 - Should not protrude more than 2mm

MIDFACE EVALUATION

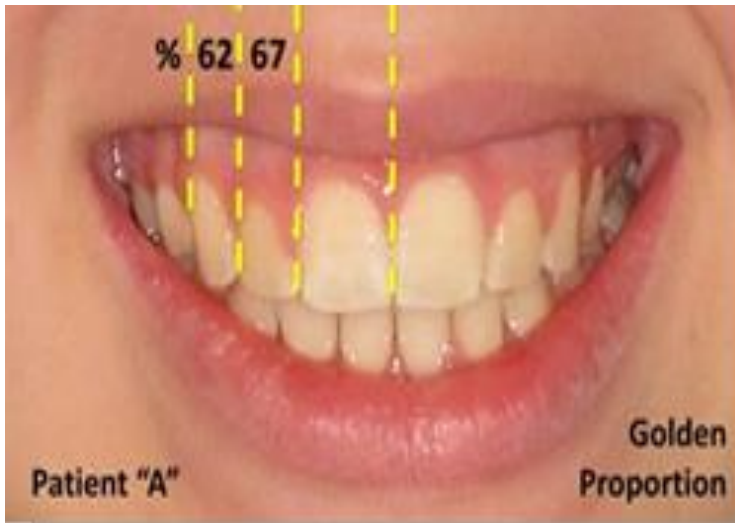


MIDFACE EVALUATION

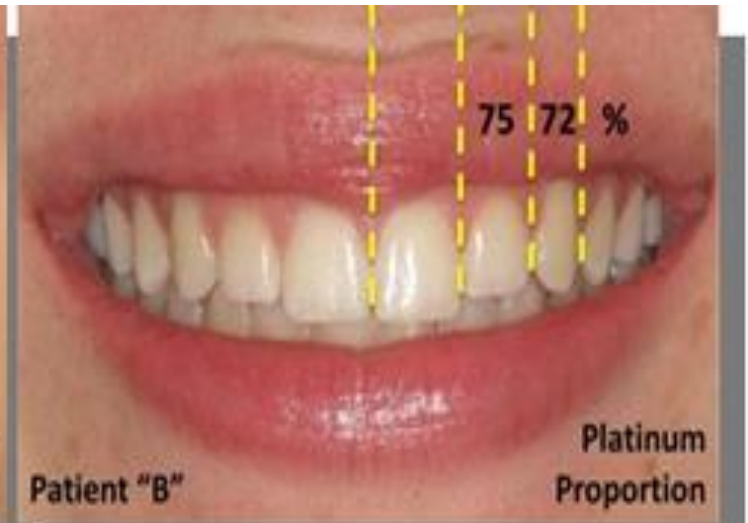


- Zygomatic arch area
- Middle contour area
- Subpupillary area
- Nasal base upper lip area
- Three areas constitute the cheekbone contour
- All three areas appear deficient in maxillary retrusion
- All three areas should be evaluated separately when reconstruction is planned

Changing concept from Golden Proportion to Platinum Proportion



In a Golden Proportion smile, the next tooth in line as you move to the back is roughly 62-68% as wide as the tooth in front toward the midline.



In Platinum Proportion, the next tooth in line as you move to the back is roughly 75-80% as wide as the tooth in front toward the midline.



EVALUATION OF SMILE- “MINIESTHETICS”

- The perception of dentofacial esthetics by orthodontists and patients has differed considerably.
- An unposed smile is involuntary and is induced by joy or mirth.
- All the muscles of facial expression are recruited in the process, causing a pronounced deepening of the nasolabial folds and squinting of the eyes.



Can we change
SMILE ??



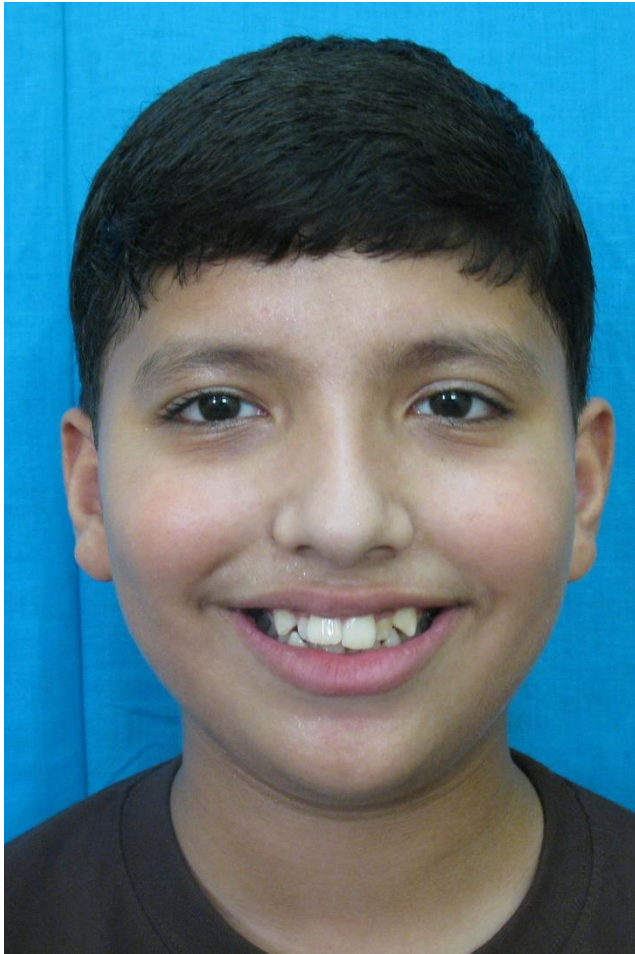
Determinants of Smile

1. Midlines
2. Smile line
3. Phonetics
4. Buccal Corridor
5. Shade of tooth



- A non-posed smile is natural in the sense it expresses authentic human emotion.
- A posed or social smile is voluntary and need not be elicited or accompanied by emotion.

MIDLINE







SMILE LINE



Morley ratio

In a youthful smile, 75-100% of the maxillary central incisors should be positioned below an imaginary line drawn between the commissures



Quantitative elements of Gummy smile



Vertical elements



Incisor display

Excessive incisor display

Incomplete incisor display



Incisor/gingival hts



Transverse elements



Midlines



Transverse
cant





PHONETICS







BUCCAL CORRIDOR

- A dimension of interests to prosthodontists and orthodontists, is the amount of buccal corridor which is displayed on smile, that is, the distance between the maxillary posterior teeth (especially Premolars) and the inside of the cheek.
- More recently, orthodontists have emphasized the diminished esthetics of an excessively wide buccal corridor or the “negative space”.





A



B



C



D

SHADE OF THE TEETH

Before



COFFEE STAIN

This 63-year-old internationally known executive was embarrassed about his stained teeth. He drank about eight cups of coffee per day, which was determined to be the cause of the staining. Even though he had frequent cleanings, the stains rapidly returned due to the amount of coffee he drank.



TEETH CLEANING AND BONDING

The first step in treating stained teeth is a professional cleaning to see how much stain will be removed. In this patient, the discolored and worn filling in the left central incisor was then replaced through composite resin bonding. The patient was advised to avoid coffee consumption to protect the esthetic life of the newly bonded restoration as well as his natural teeth. Following this dietary change, the stains have been much less noticeable between his more frequently scheduled cleaning appointments.

After



Golden Proportions of Lombardi 1978





Crown width









Step 1: Determine correct incisal position

Step2: Determine the correct gingival margins

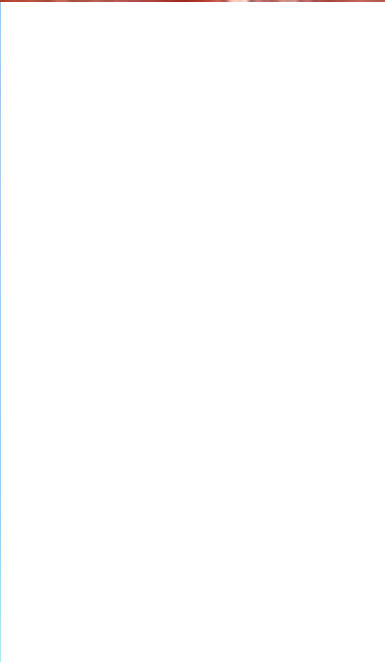


Step 3: Determine the correct/ appropriate width









What your smile reveals

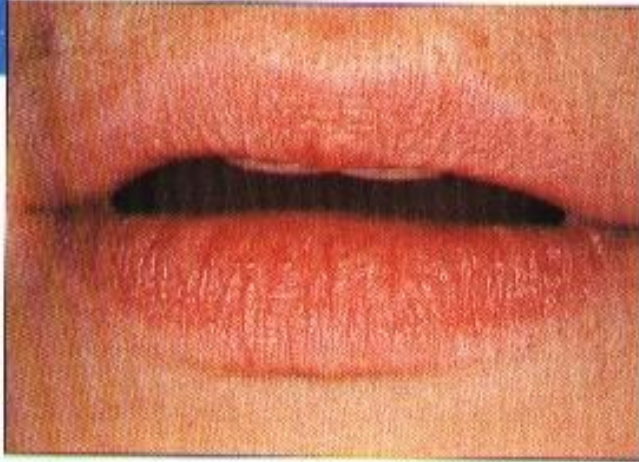
SMILE ANALYSIS

- | Yes | No | Teeth |
|--------------------------|--------------------------|---|
| <input type="checkbox"/> | <input type="checkbox"/> | 1. In a slight smile, with teeth parted, do the tips of your teeth show? |
| <input type="checkbox"/> | <input type="checkbox"/> | 2. Are your two upper front teeth slightly longer than the adjacent teeth? |
| <input type="checkbox"/> | <input type="checkbox"/> | 3. Are your two upper front teeth too long? |
| <input type="checkbox"/> | <input type="checkbox"/> | 4. Are your two upper front teeth too wide? |
| <input type="checkbox"/> | <input type="checkbox"/> | 5. Are your upper six front teeth even in length? |
| <input type="checkbox"/> | <input type="checkbox"/> | 6. Do you have a space between your front teeth? |
| <input type="checkbox"/> | <input type="checkbox"/> | 7. Do your front teeth protrude or stick out? |
| <input type="checkbox"/> | <input type="checkbox"/> | 8. Are your front teeth crowded or overlapping? |
| <input type="checkbox"/> | <input type="checkbox"/> | 9. When you smile broadly, are your teeth all one color? |
| <input type="checkbox"/> | <input type="checkbox"/> | 10. Do your teeth have white or brown stains? |
| <input type="checkbox"/> | <input type="checkbox"/> | 11. If your front teeth contain tooth-colored fillings, do they match the shade of your teeth? |
| <input type="checkbox"/> | <input type="checkbox"/> | 12. Is one of your front teeth darker than the others? |
| <input type="checkbox"/> | <input type="checkbox"/> | 13. Are your lower six front teeth straight? |
| <input type="checkbox"/> | <input type="checkbox"/> | 14. Are your lower six front teeth even in appearance? |
| <input type="checkbox"/> | <input type="checkbox"/> | 15. In a full smile, the back teeth normally show. Are your back teeth free of stains and discolorations from unsightly restorations? |
| <input type="checkbox"/> | <input type="checkbox"/> | 16. Do the necks of your teeth indicate erosion, a ditched-in "V," that either can be seen or felt with your fingernail? |
| <input type="checkbox"/> | <input type="checkbox"/> | 17. When you smile broadly, does your top lip rise above the necks of your teeth so that your gums show? |
| <input type="checkbox"/> | <input type="checkbox"/> | 18. Do your restorations—fillings, laminates and crowns—look natural? |
| Gums | | |
| <input type="checkbox"/> | <input type="checkbox"/> | 19. Are your gums pink and "knife-edged," or are they red and swollen? |
| <input type="checkbox"/> | <input type="checkbox"/> | 20. Have your gums receded from the necks of the teeth? |
| <input type="checkbox"/> | <input type="checkbox"/> | 21. Does the curvature of your gum around each tooth create a half-moon shape? |
| Breath | | |
| <input type="checkbox"/> | <input type="checkbox"/> | 22. Is your mouth free from decay or gum disease that can cause bad breath? |

If you could alter your smile, what would you most like to change? _____

In a slight smile with teeth parted, do the tips of your teeth show?

Before



LOW LIPLINE

This thirty-eight-year-old businesswoman was concerned with her low lipline, which made her appear as if she had no teeth.



Before treatment.

After



ORTHODONTICS PLUS FULL CROWNS

Orthodontic treatment improved the bite (the way the teeth meet) so the front teeth could be lengthened. After orthodontic treatment, full crowns were placed on the upper front teeth to improve this woman's smileline.



After treatment.

Do you have space between your front teeth ?

Before



SPACE BETWEEN FRONT TEETH

A space between the two front teeth can be distracting, causing the viewer to look from your eyes to your mouth.

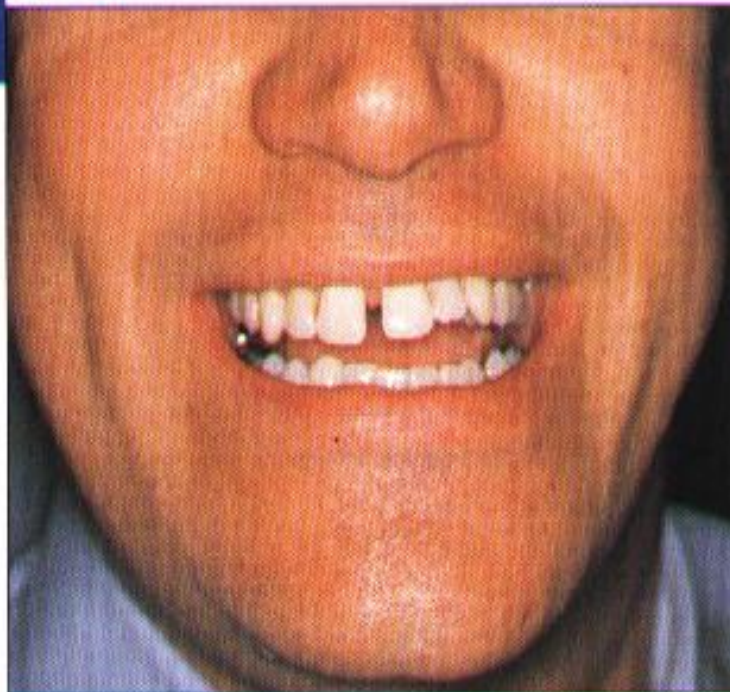
After



COSMETIC CONTOURING AND BONDING

The teeth were first cosmetically contoured so the new shapes would blend in better with each other. Closing such spaces allows people to see your entire face rather than focusing on distracting parts of it.

Before



*DIASTEMA (SPACE) AND MIDLINE
DEVIATION*

This network television correspondent had a large gap between his front teeth. The teeth were off center and caused a midline deviation. Because television tends to magnify the size of a space, it was desirable to have the space closed. The space also called more attention to the midline deviation and facial asymmetry.



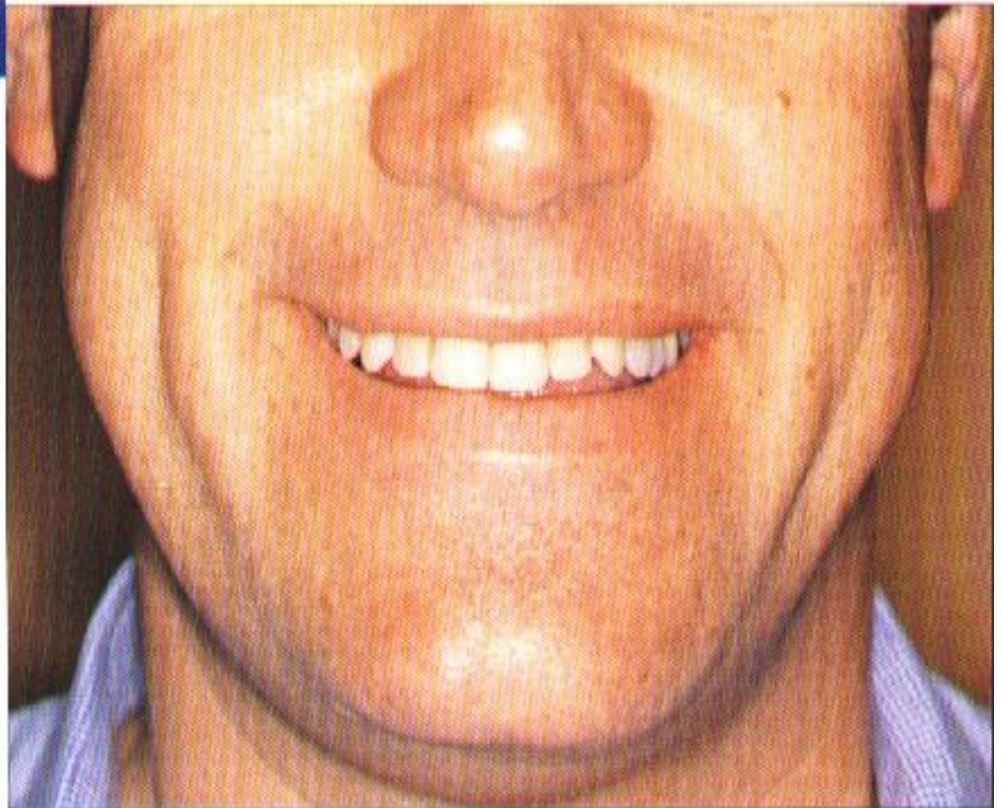
Tooth-colored wire and plastic brackets were used because of the esthetic demands of this patient's vocation. During the time he was undergoing orthodontic treatment, viewers did not even realize it due to the almost invisible appearance of these appliances from a distance.



*A*fter

ORTHODONTICS AND BONDING

About eighteen months were required to produce this more flattering smile. Notice how no attention is called to the now seemingly minor midline deviation when the teeth are together. The final procedure was to bond the front teeth together with composite resin to keep the space from recurring. Orthodontic movement improved his smile as well as his bite.



Are your front teeth crowded or overlapping ?

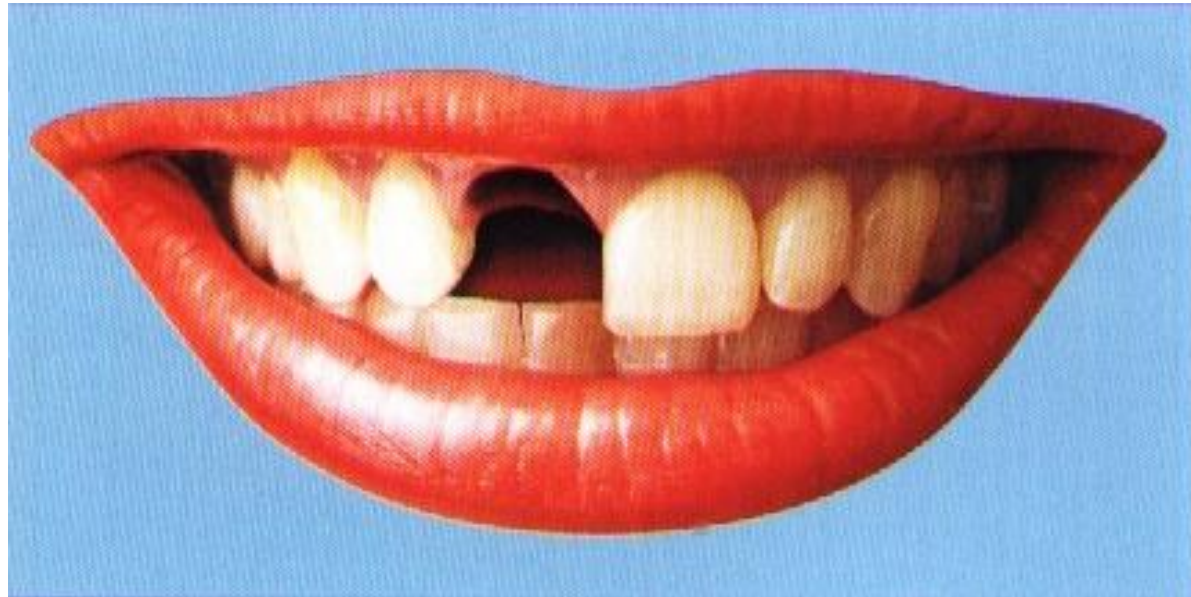


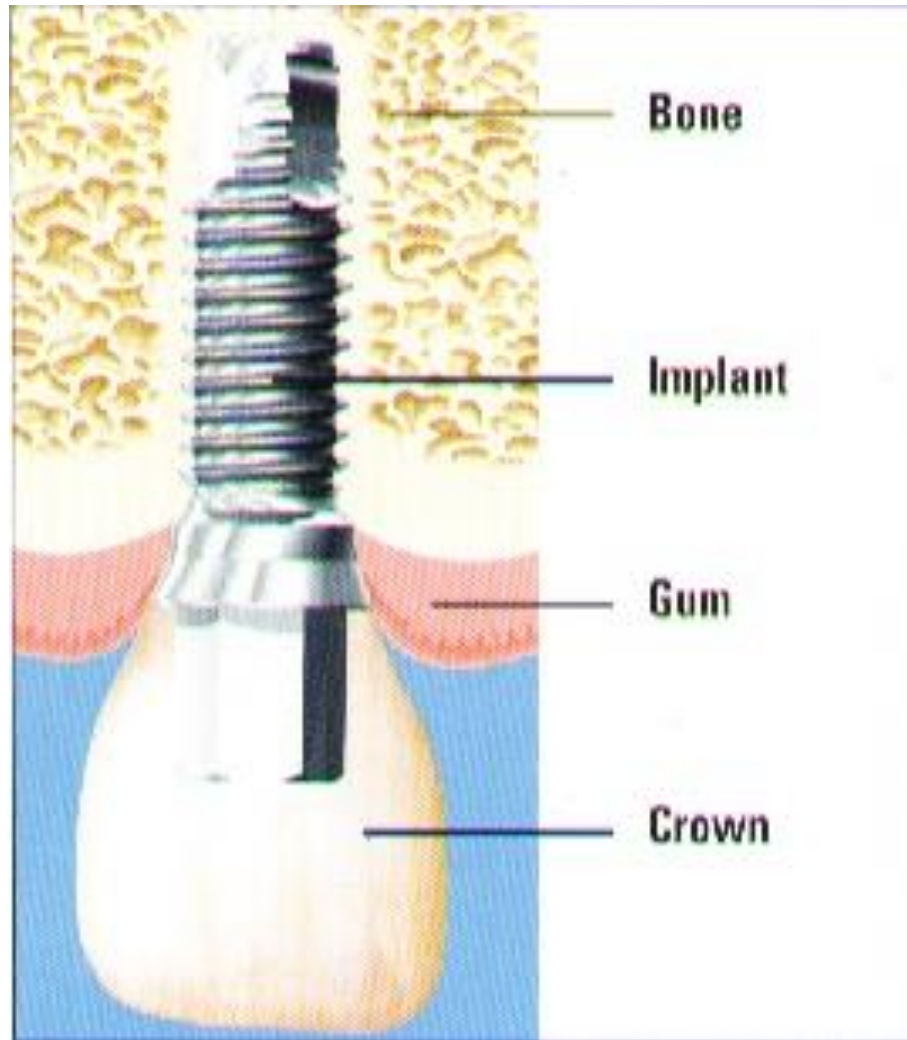


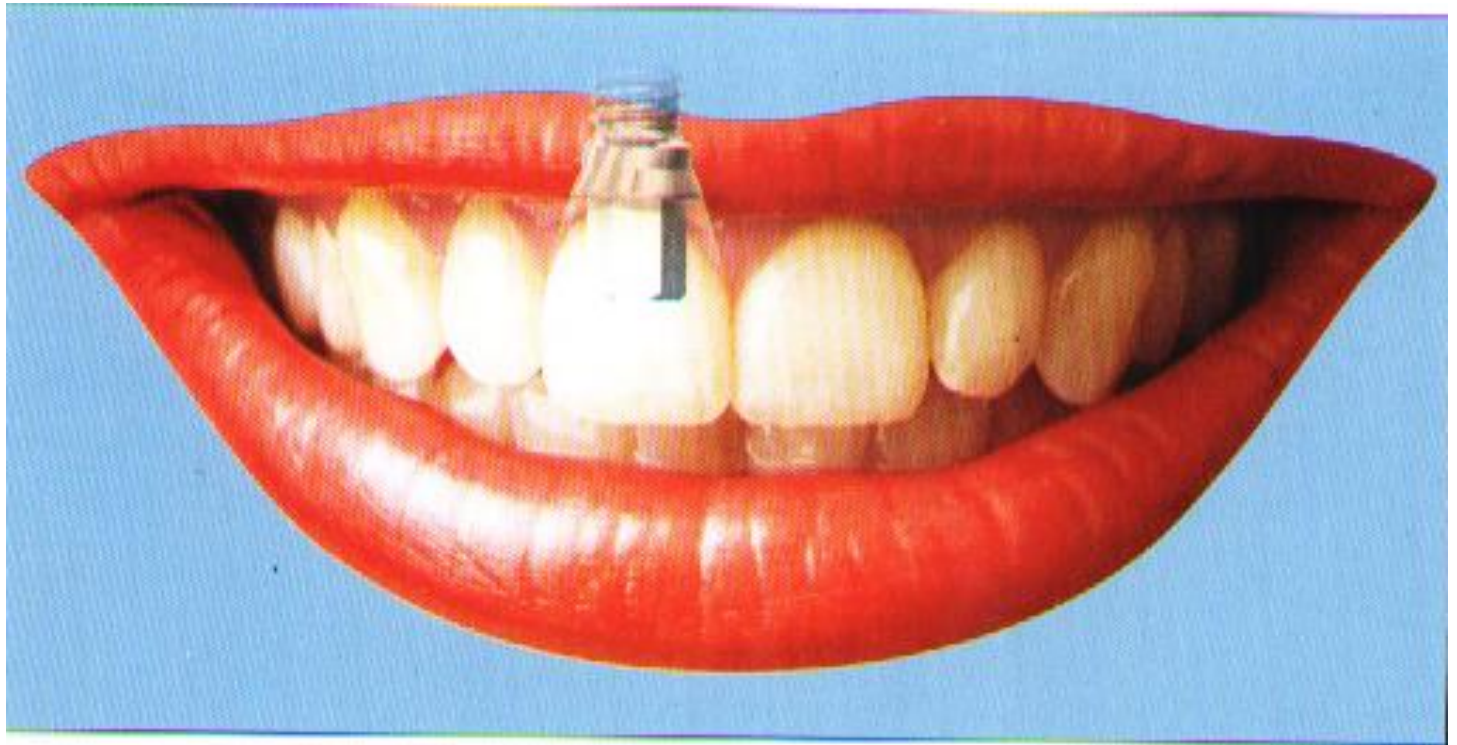




Do you have any tooth/teeth missing ?









Do your teeth have white or brown stains?

Before



DARK STAINS

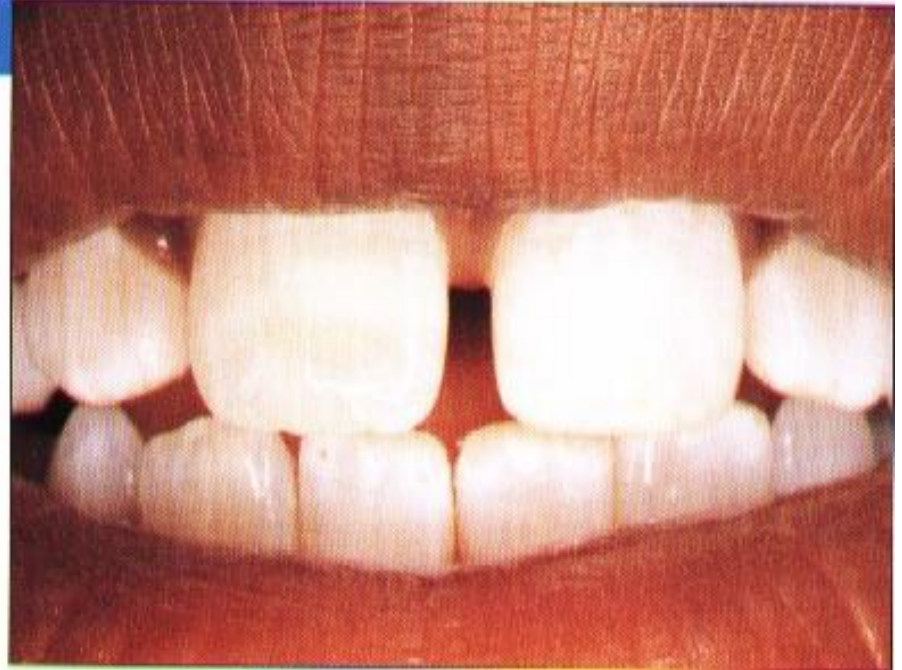
This 11-year-old-boy hated to smile because he was kidded by his friends about his dark front teeth. It was believed that the child was given too much of a particular prescription drug, which caused the stain.



*A*fter

BLEACHING

After one bleaching treatment, the stains nearly disappeared. Stains of this type, however, often require several bleaching treatment sessions.



Do your restorations - fillings, laminates and crowns - look natural ?



UNNATURAL-LOOKING CROWNS

Unnaturalness in this smile is revealed by the dark line around the two right front crowned teeth. Also, the shapes of the crowned teeth are inconsistent with the adjacent teeth. Finally, the porcelain is so opaque (lacking translucence) that it does not blend in with the color, or even texture, of the adjacent teeth. Since this young man was a model, his smile was of the utmost importance. Due to the unnaturalness of his smile, it limited the work he could do.

Are your gums pink and “knife-edged” , or they are red and swollen ?

INFLAMED GUM TISSUE

This patient's high lip line reveals an otherwise attractive set of teeth. The smile, however, is ruined by red, swollen and puffy gums. This is typical of patients with gum disease. The puffy gums are caused by bacterial plaque. Proper oral care can restore this smile to its original beauty.







Thank you for inviting
me !!!

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