# Occlusion

**“The external mystery of the world is its comprehensibility.”**

***Albert Einstein 1936***

# Occlusion

# Course Introduction

# Occlusion

## *"The Achilles Heel of Dentistry ?"*

*© A/P Keson B C Tan*
*BDS(Hons) , MSD*

**"Disorders of the masticatory system are the very substance of dentistry."**

***Bell, 1982***

**"Order and simplification are the first steps towards the mastery of a subject - the actual enemy is the unknown."**

***Thomas Mann***
***German Writer***

# Concepts of Occlusion


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**Oc = up**

**clusion = closing**

# Dental Articulation

**The contact relationship of maxillary and mandibular teeth as they move against each other.**
**The placing of an artificial tooth in its proper position in the dental arch.**

***Glossary of Prosthodontic Terms 1987***

# Occlusion

**The static relationship between the incising or masticating surfaces of the maxillary or mandibular teeth or tooth analogues**

***Glossary of Prosthodontic Terms 1987***

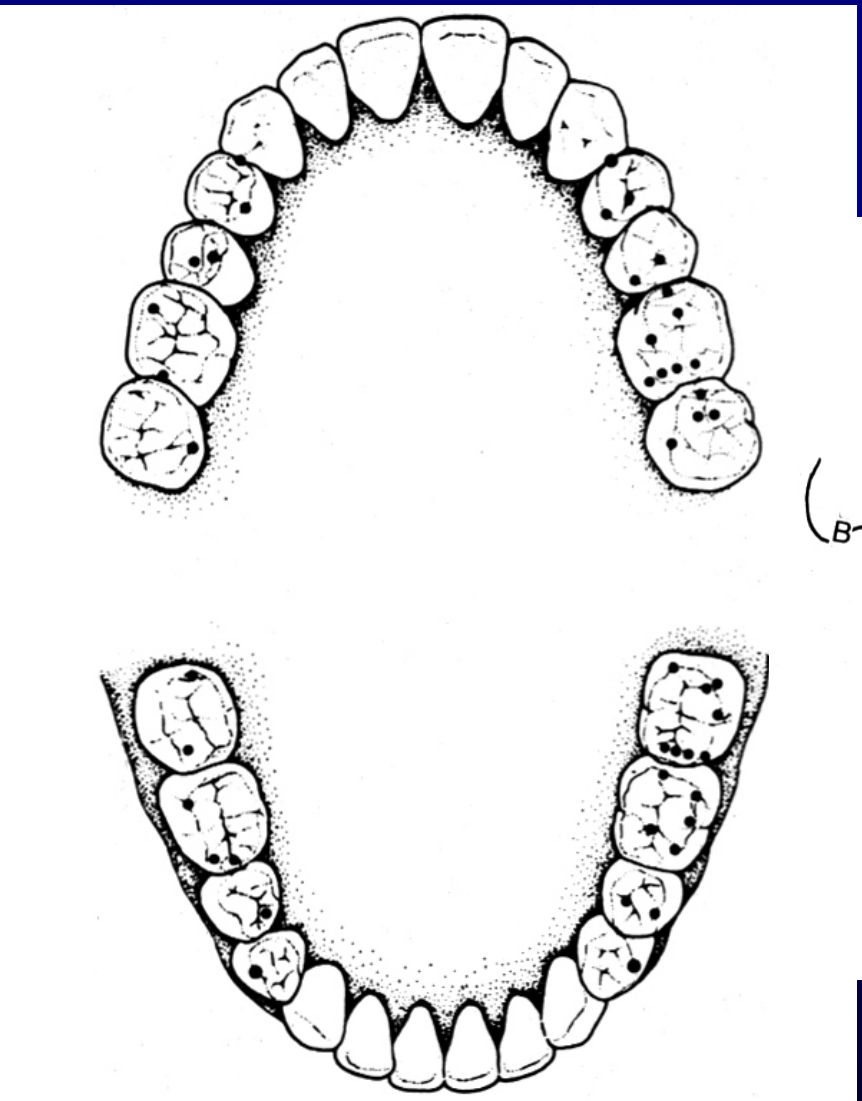
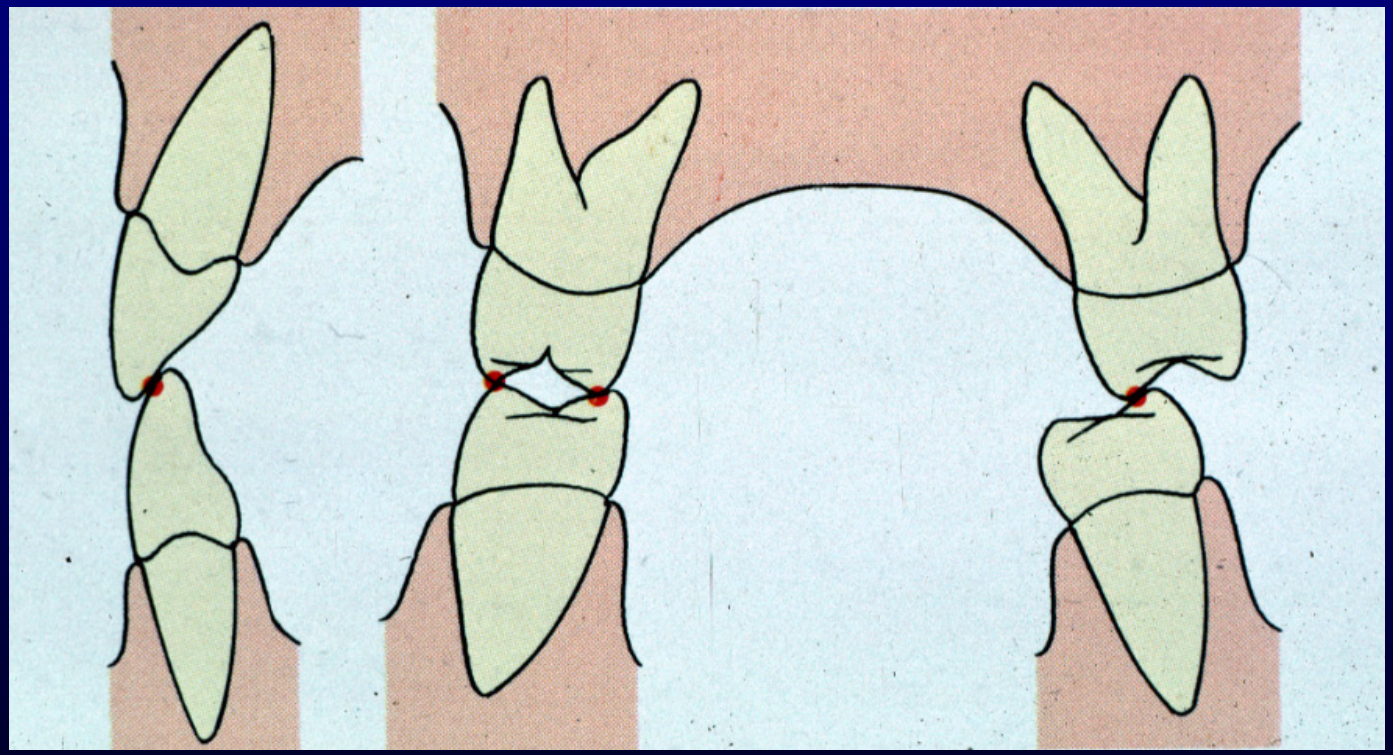



**Fig. 21-1** Two types of typical, naturally occurring contact patterns. The right side is a cusp tip–fossa pattern, whereas the left side has a tripod contact relationship in the molar region, with a cusp tip–fossa pattern in the premolar region.

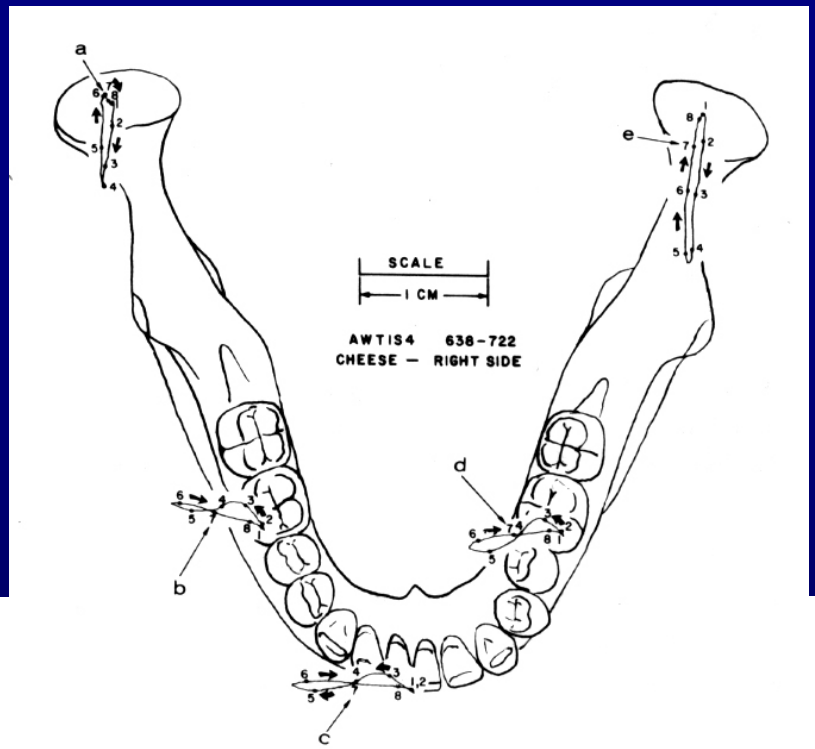
# BALANCED ARTICULATION

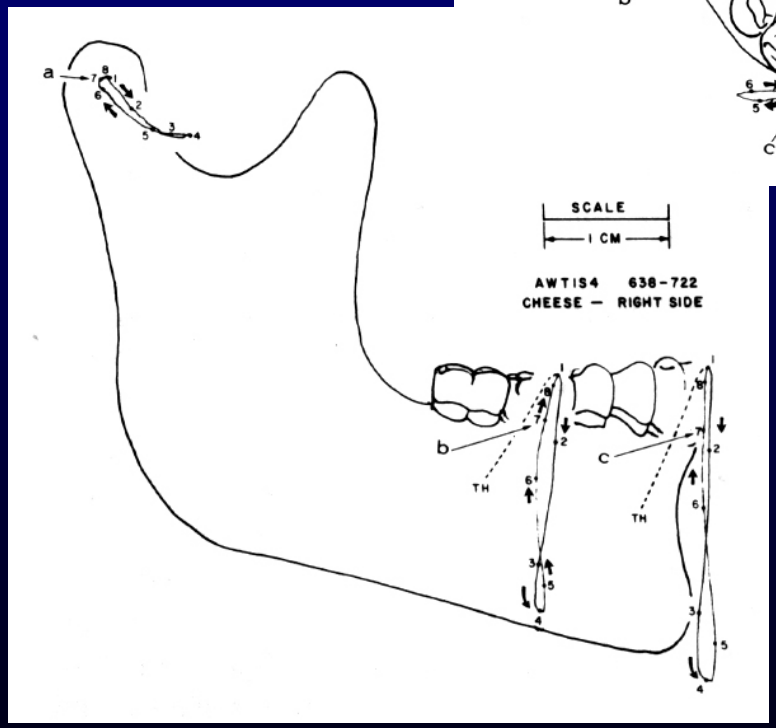


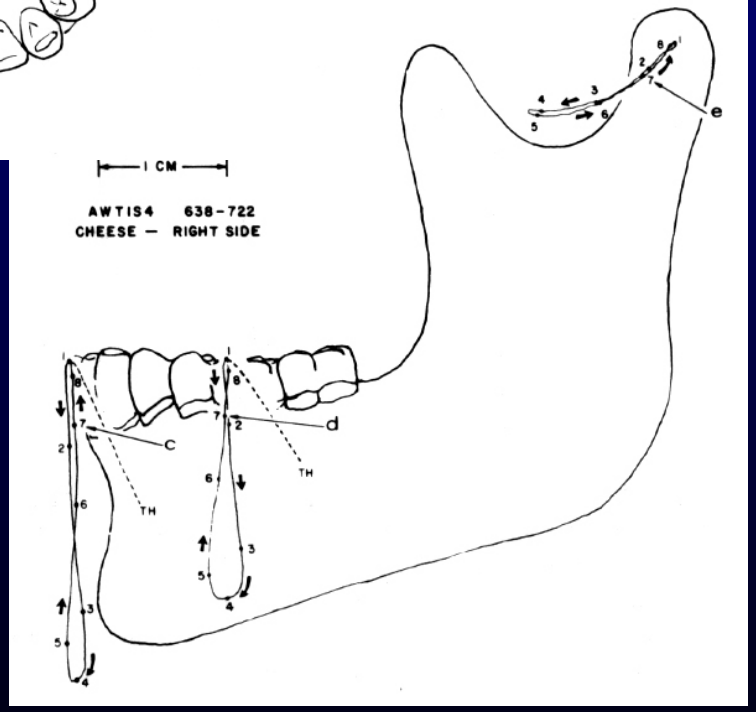
# Mastication

**The process of chewing food for swallowing and digestion.**

***Glossary of Prosthodontic Terms 1987***






WS

NWS

The biologic process of chewing is often viewed simply as a structural or mechanical interaction of the mandibular teeth with the maxillary teeth. Emphasis on determinants of jaw movements in terms of the surfaces of the teeth and their relative position with the temporomandibular joint falls short of complete analysis of this complex function.

**"The dentition proper represents only the working ends of the apparatus, the tools by which mastication is accomplished, not the system itself."**

***Bell, 1982***

**"When you don't know what you don't know, there are no problems; it's only when you know what you don't know that you see them."**

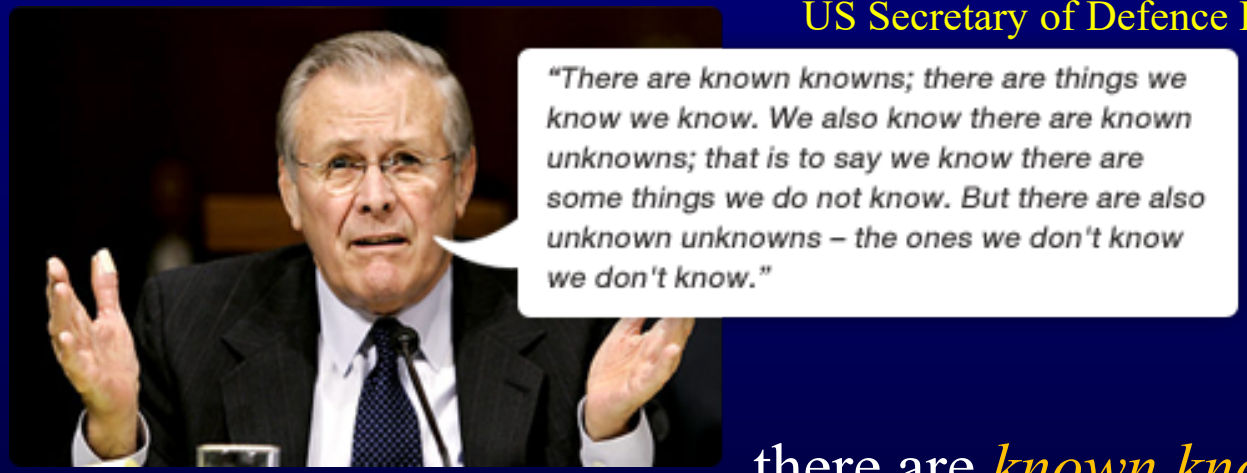
***Wise***

# The Unknown Unknowns

## *Donald Rumsfeld* 2002

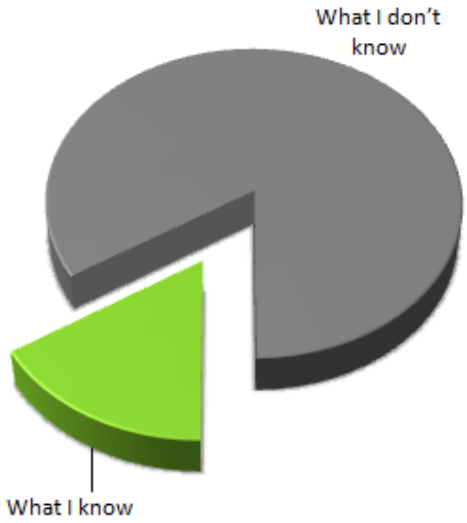
February 2002 U.S. Department of Defense (DoD) news briefing on the lack of evidence linking the government of Iraq with the supply of WMD to terrorist groups.

US Secretary of Defence Rumsfeld stated:




….. there are *known knowns*; there are things we know that we know. We also know there are *known unknowns*; that is to say we know there are some things we know we do not know.
But …. there are also ***unknown unknowns*** – the ones we don't know we don't know. And ……., it is the latter category that tend to be **the difficult ones**. …….

## How we think about knowledge



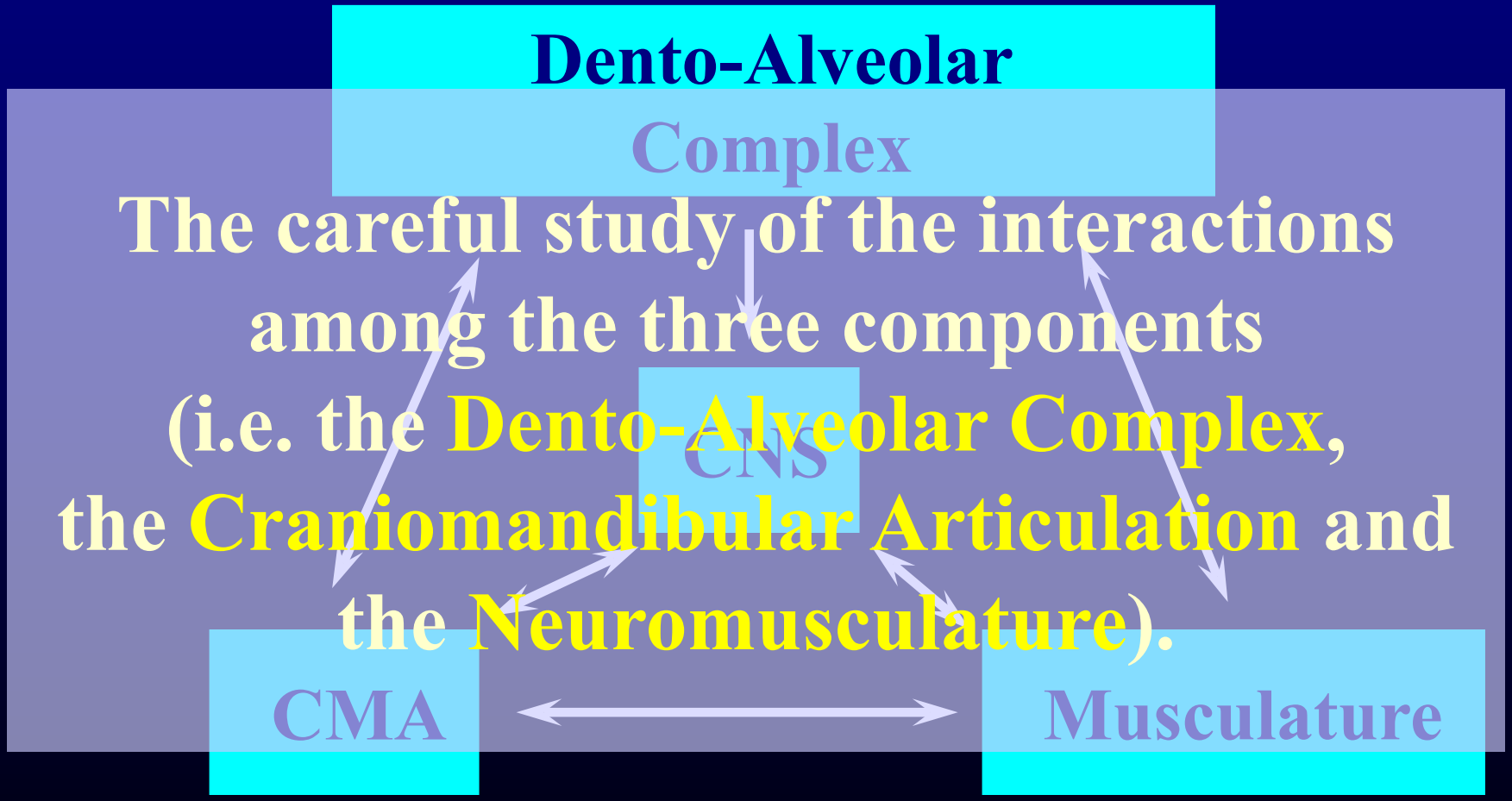
"This static anatomic view has given way to a much broader and more dynamic conceptual viewpoint which embraces all the functional, parafunctional and dysfunctional interrelationships that exist amongst the components of the somatognathic system as a result of contacts between the occlusal surfaces of the teeth." This definition includes psychological as well as physiological aspects of function and dysfunction.

**It is misleading to students when proponents of a philosophy state Principles or "Laws" of Occlusion. This implies an absoluteness and factualism which is deceptive since occlusion**

***is a dynamic and chronically changing relationship.***

**Concepts of occlusion and mechanical laws of articulation should therefore not be thought of as one and the same.**

# Somatognathic System




**The careful study of the interactions among the three components (i.e. the Dento-Alveolar Complex, the Craniomandibular Articulation and the Neuromusculature).**

# Dento-Alveolar Complex

# Craniomandibular Articulation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# Neuromuscular System

**The maintenance of the integrity of the functional and structural aspects of the oral facial complex rests predominantly with the Neuromuscular System.**

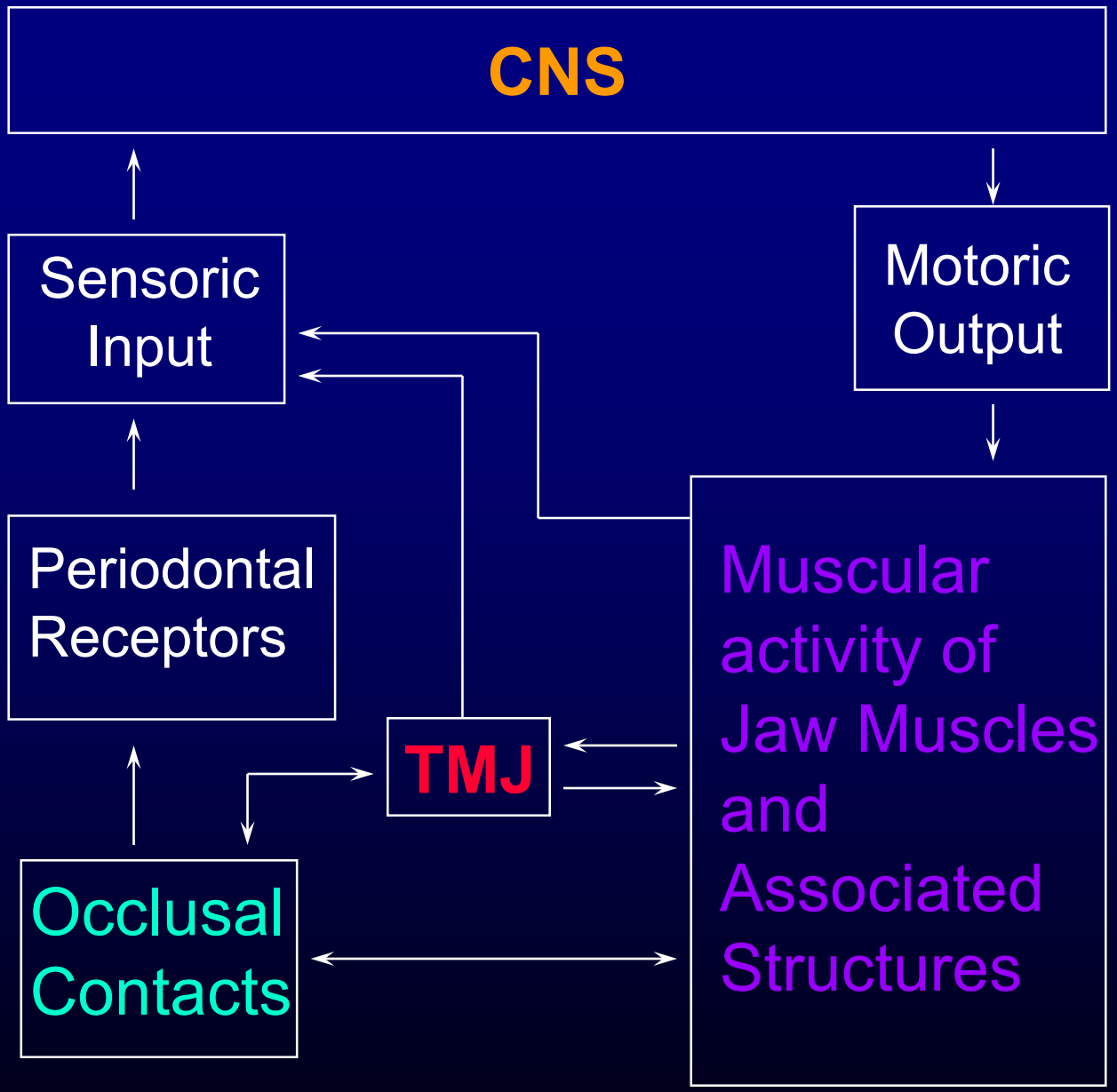



Fig: Functional Cycle of the Stomatognathic System

**Proper treatment depends on the knowledge of the initial situation of each of the components and of the mechanisms used to restore the harmony between Form and Function.**

**Because occlusal relationships are not static, the neuromuscular reflexes change in response to the changing occlusal position.**

**The safety valve is the patient's range of adaptability, learning how to take advantage of it, and how not to exceed it is the key to successful dental treatment.**

# Clinical Success

*is not*
scientific proof
of a

***Cause and Effect***
**Relationship**

**"Experience does not ever err, it is only your judgement that errs in promising itself results which are not caused by your experiments."**

***Leonardo Da Vinci***

***c.1510***

# Occlusion

- The Functional, Parafunctional and Dysfunctional relationships
- that exists amongst the components of the stomatognathic system
- as a result of the contacts between the occlusal surfaces of the teeth

**"Health is well being, whether or not disease or disability is present, provided that the experience of disease or disability is not dysfunctional to the individuals concerned"**

***Williamson, 1977***

Diagnosis and treatment of cranio-mandibular disorders are amongst the most difficult and frustrating problems to face clinically they are multi-causal etiology and a strong psycho-physiologic prevalence as evidenced by the wide range of reported success of different treatments

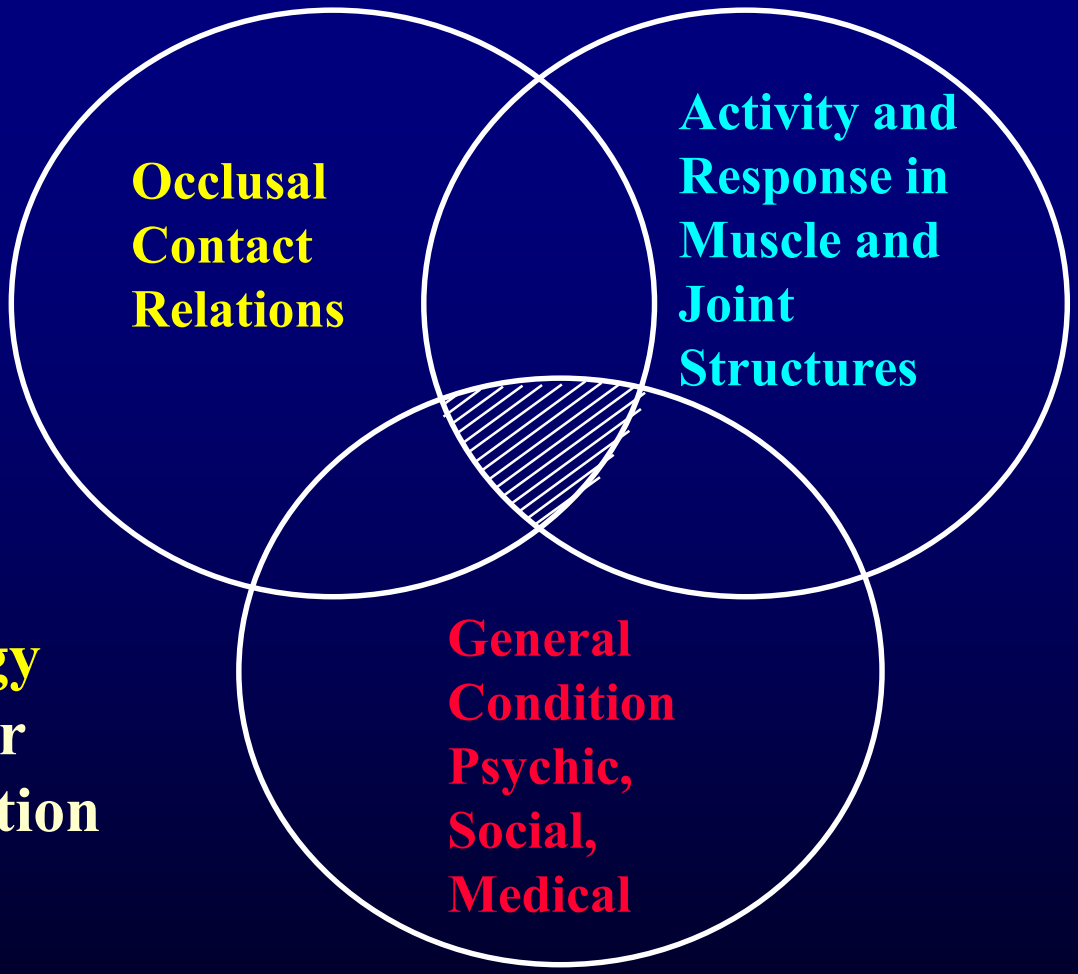


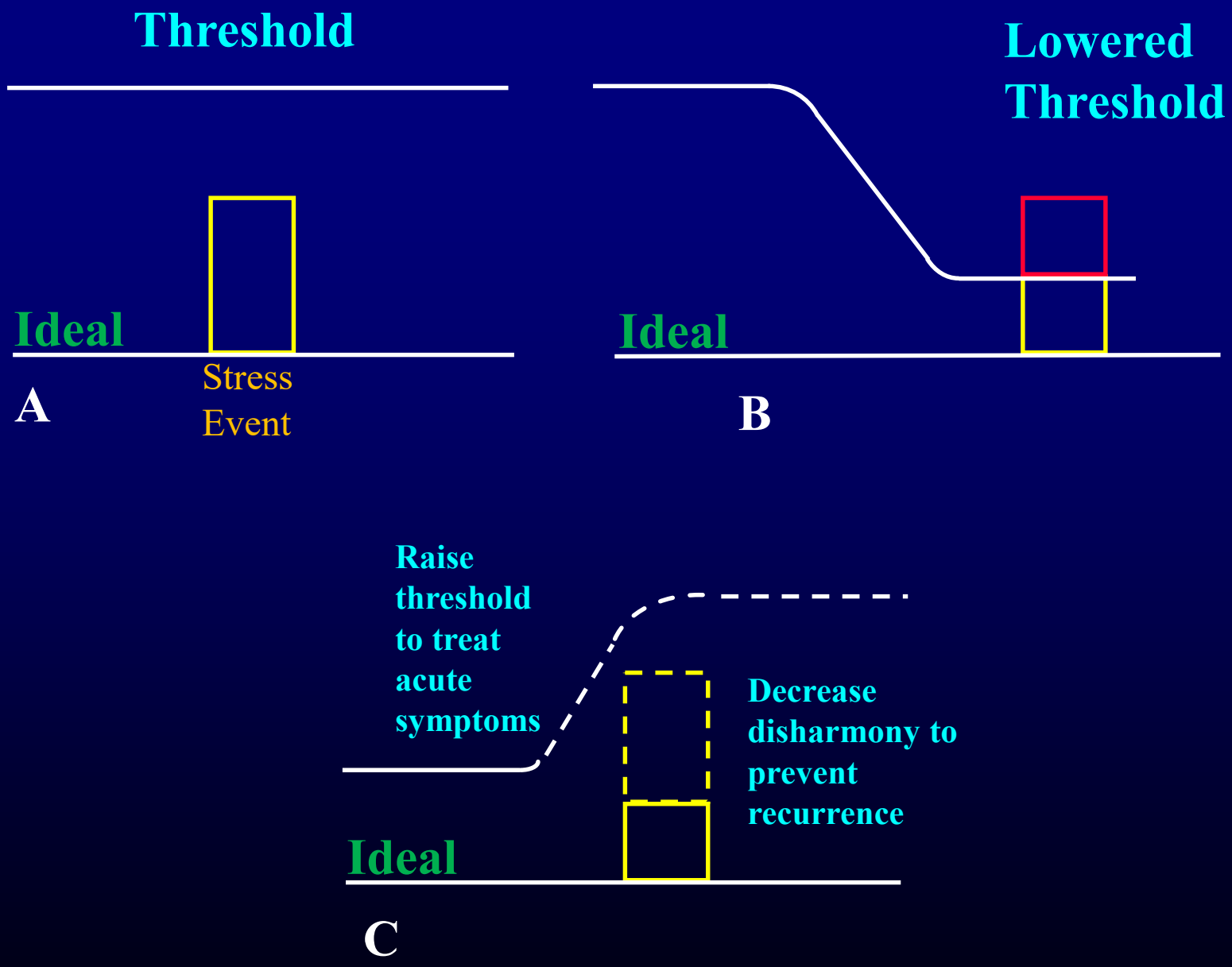

**Fig. Multifactorial Etiology of Temporomandibular Function and Dysfunction**

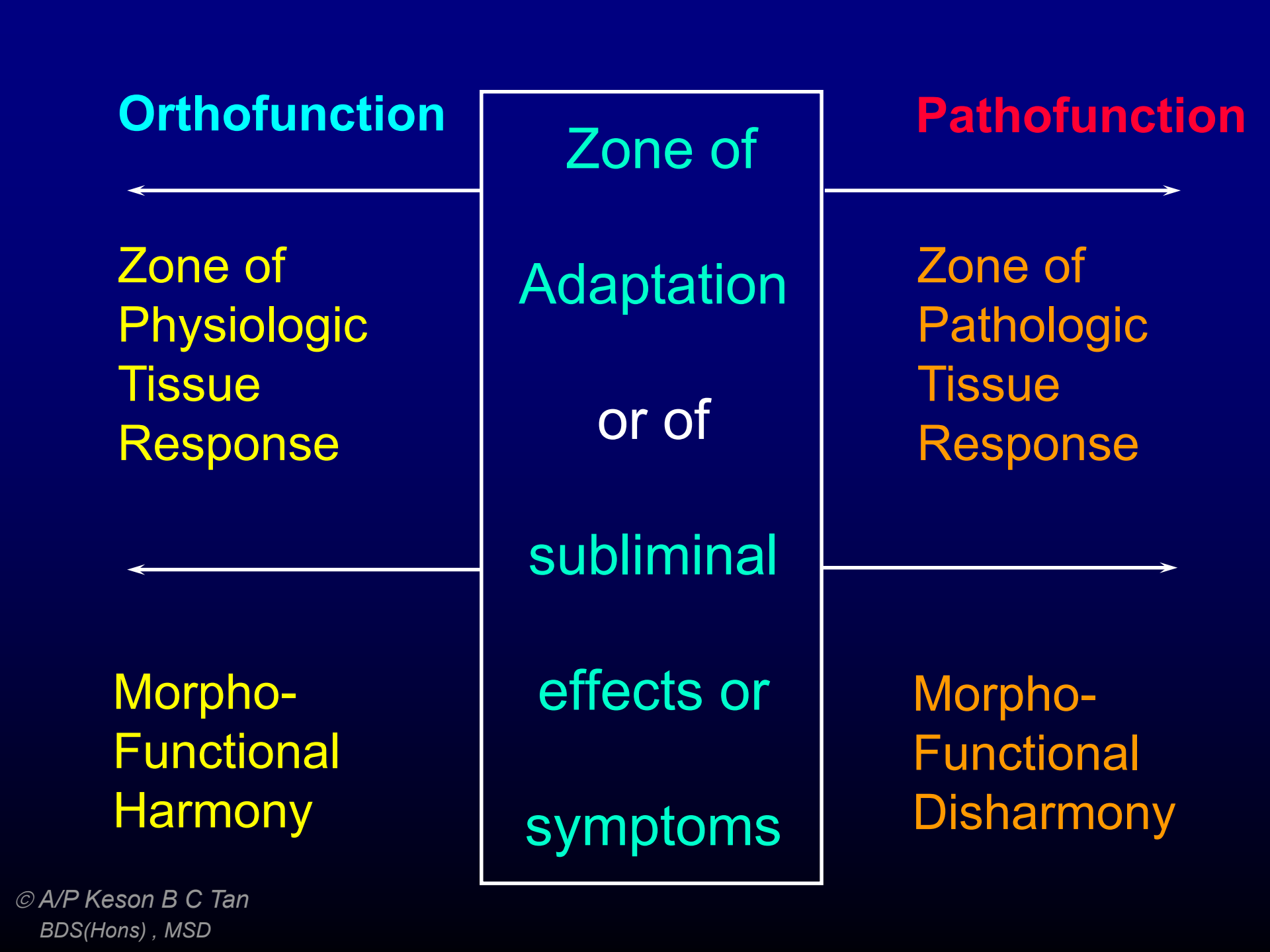
# Normal Occlusion

- An occlusion which is typical, usual or in accordance with the standards of a given population
- may be Physiologic or Pathologic

# Physiologic Occlusion

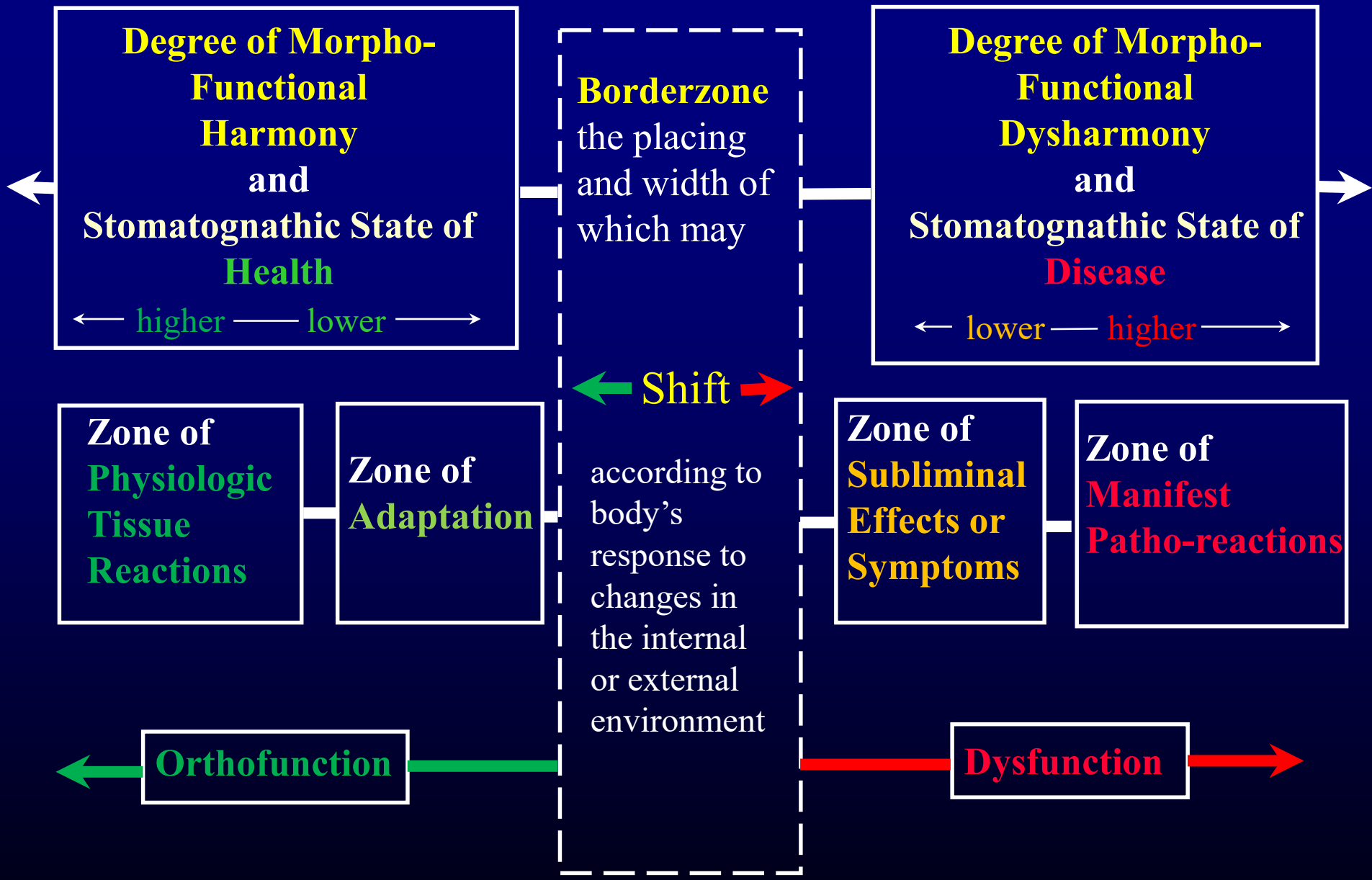
- Any occlusion which exhibits *sufficient morphofunctional harmony* between the anatomic and neuromuscular controls of mandibular function such as not to induce breakdown processes within the tissues of the somatognathic system.
- This range of *physiologic response* may show a biologic variation from an ideal response to a state of adaptation





"The normal in physiology is always a range, never a point."

***T.O Lerance***



# Pathologic Occlusion

- Any occlusion judged to be a causal factor in the formation of traumatic lesions or disturbances within the tissues of the stomatognathic system
- Criterion: whether or not an occlusion produces injury,

  NOT: how the teeth occlude

# Therapeutic Occlusion

- Any treatment occlusion employed to counteract structural inter-relationships related to a pathologic occlusion
- Ideally, evoked adaptive responses to such therapeutic intervention should be minimal

# Orthofunction

# Vs

# Dysfunction

| SYMPTOMS | FUNCTION | FORM (OCCLUSION) | DIAGNOSIS |
|---|---|---|---|
| Lack of Pathologic Sequelae | Ideal Function<br>**ORTHOFUNCTION**<br>Normal Function | *Ideal Occlusion*<br>*Normal Occlusion* | *Therapeutic Occlusion*<br>*Physiologic Occlusion* |
| Pathologic Sequelae Present | *$1^0$ Functional disturbances*<br>**DYSFUNCTION**<br>Functional Disorders | Occlusion varies from normal to grossly abnormal | *Traumatic Occlusion* |

# TM Disorders (TMD)

- A collective term embracing a number of clinical problems that involve the masticatory musculature, the TMJ, or both
- A sub-classification of musculoskeletal disorders
- Not a syndrome but a cluster of related disorders in the masticatory system that have many features in common

# TM Disorders (TMD)

**"..... a complex, multifactorial problem involving a great array of morphofunctional variables, environmental stresses and widely varying adaptability among individuals."**

***Solberg, 1985***

**"It is much more important to know what sort of *patient* has a disease (disorder), than what sort of *disease* (disorder) a patient has."**

***Sir William Osler***

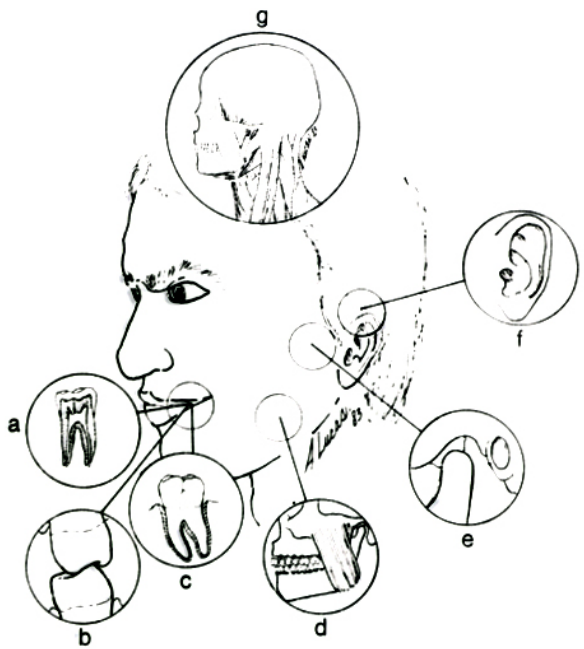



**Fig. 7-1.** When structural tolerances of the masticatory system are exceeded, various structures can break down, leading to symptoms. Some of the more common symptoms are *(a)* pulpitis, *(b)* tooth wear, *(c)* tooth mobility, *(d)* masticatory muscle pain, *(e)* TMJ pain, *(f)* ear pain, and *(g)* headache pain.

# Clinical Success

- Not necessarily a physiologic sanction of a particular occlusal philosophy or technique but rather, a tribute to the enormous *Adaptive Capacity* of the patient
- Breeds empiricism - an obstacle to research in occlusion

**“Any attempt to prove an anatomical concept by clinical success is merely rationalization and certainly is not to be regarded as truly scientific evidence.”**

A

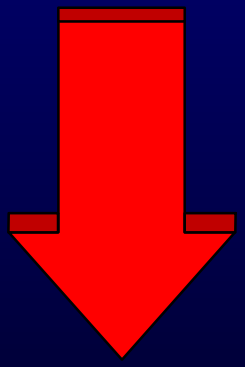
Structural or Morphologic factors

+

B

Functional factors

May lead to the development of a Non-Physiologic Occlusion



Patients may present with either A or B predominating , or an ill defined mixture of A and B

A Structural or morphologic factors ± B Functional factors

May lead to the development of a

Nonphysiologic occlusion

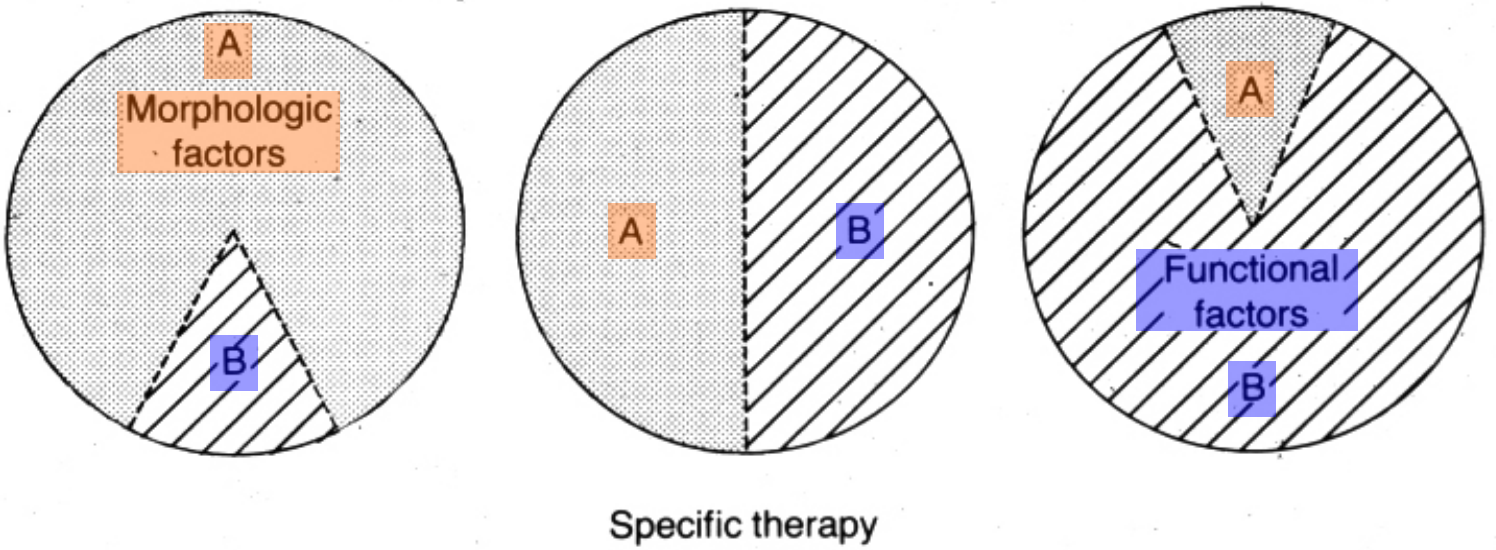
⇓

Patients may present with either A or B predominating, or an ill-defined mixture of A and B.

**General treatment sequence should include:**

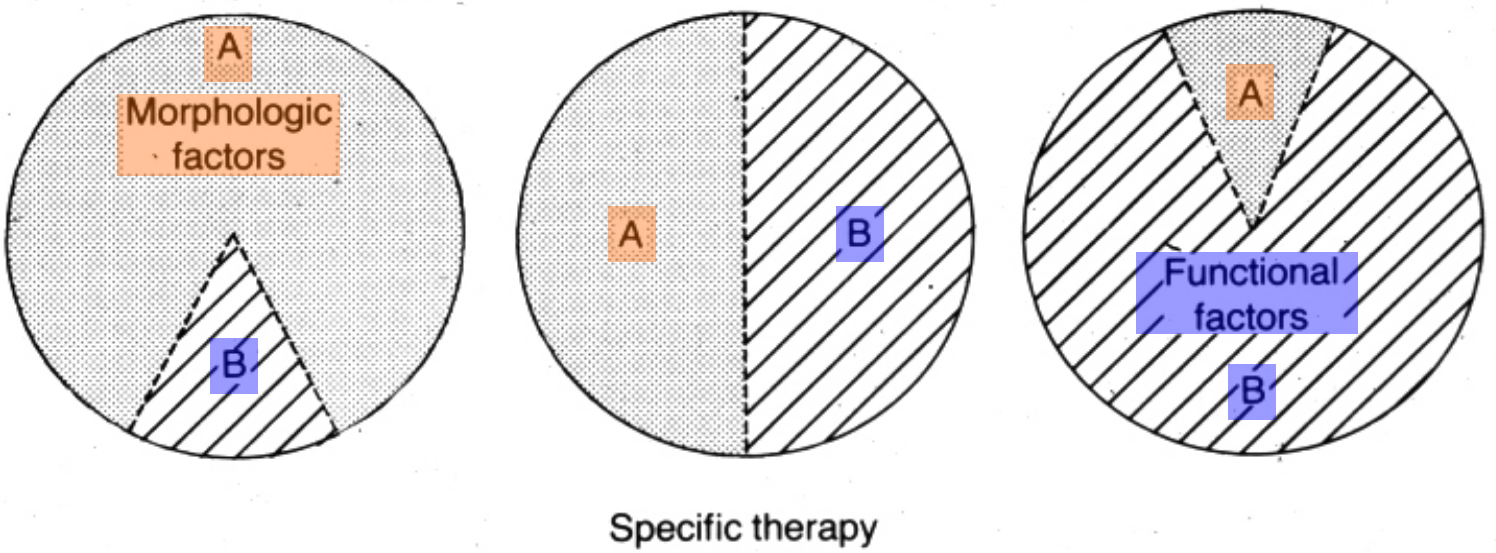
1. Symptomatic therapy (reduction of pain/discomfort)
2. Control of contributory factors
3. Treatment of pathologic sequelae
4. Maintenance of restored state of adaptation

This sequence is prescribed irrespective of the precise cause of the problem. Possible causes:




Specific therapy

This sequence is prescribed irrespective of the precise cause of the problem. Possible causes:




Specific therapy

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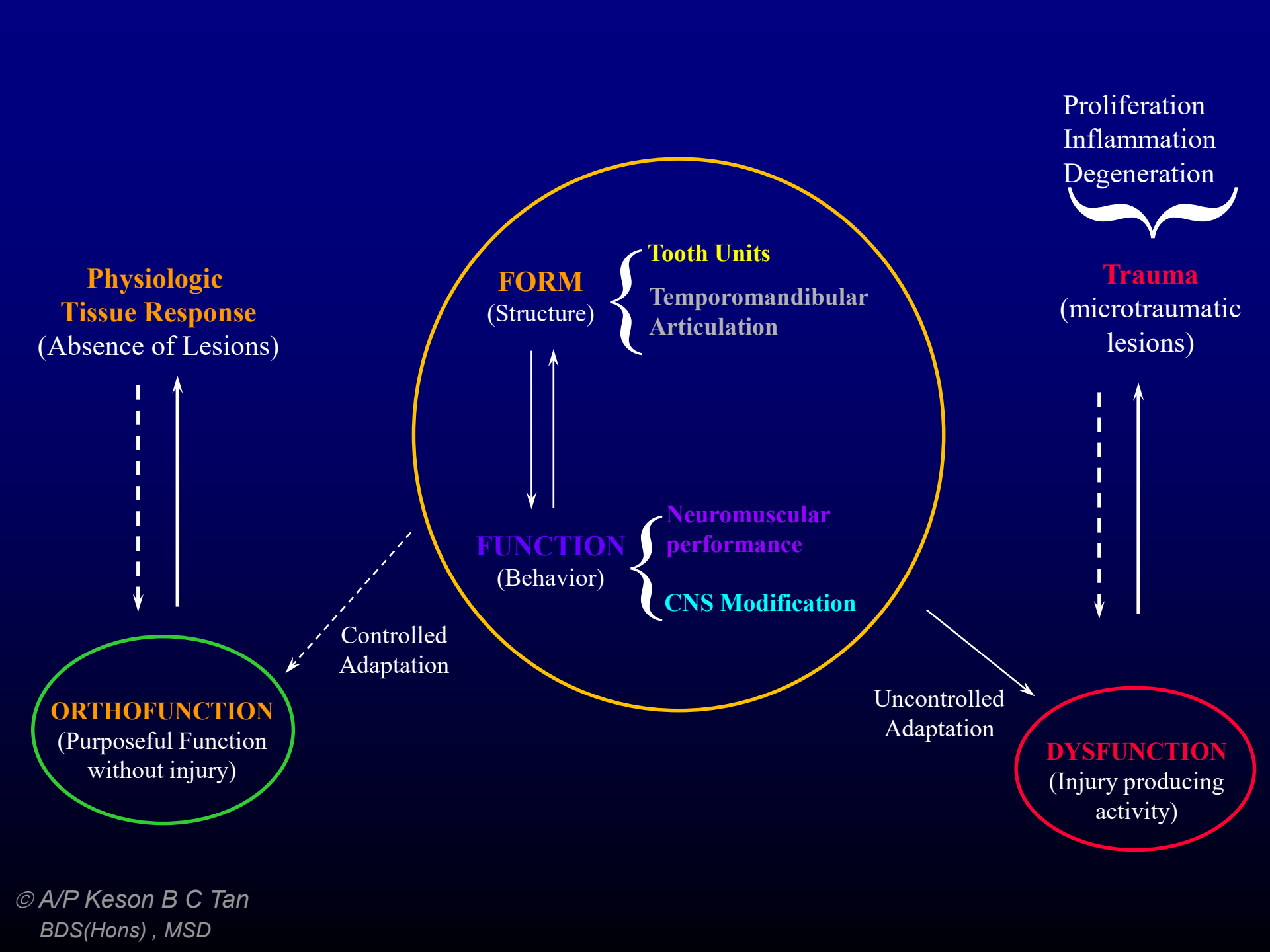
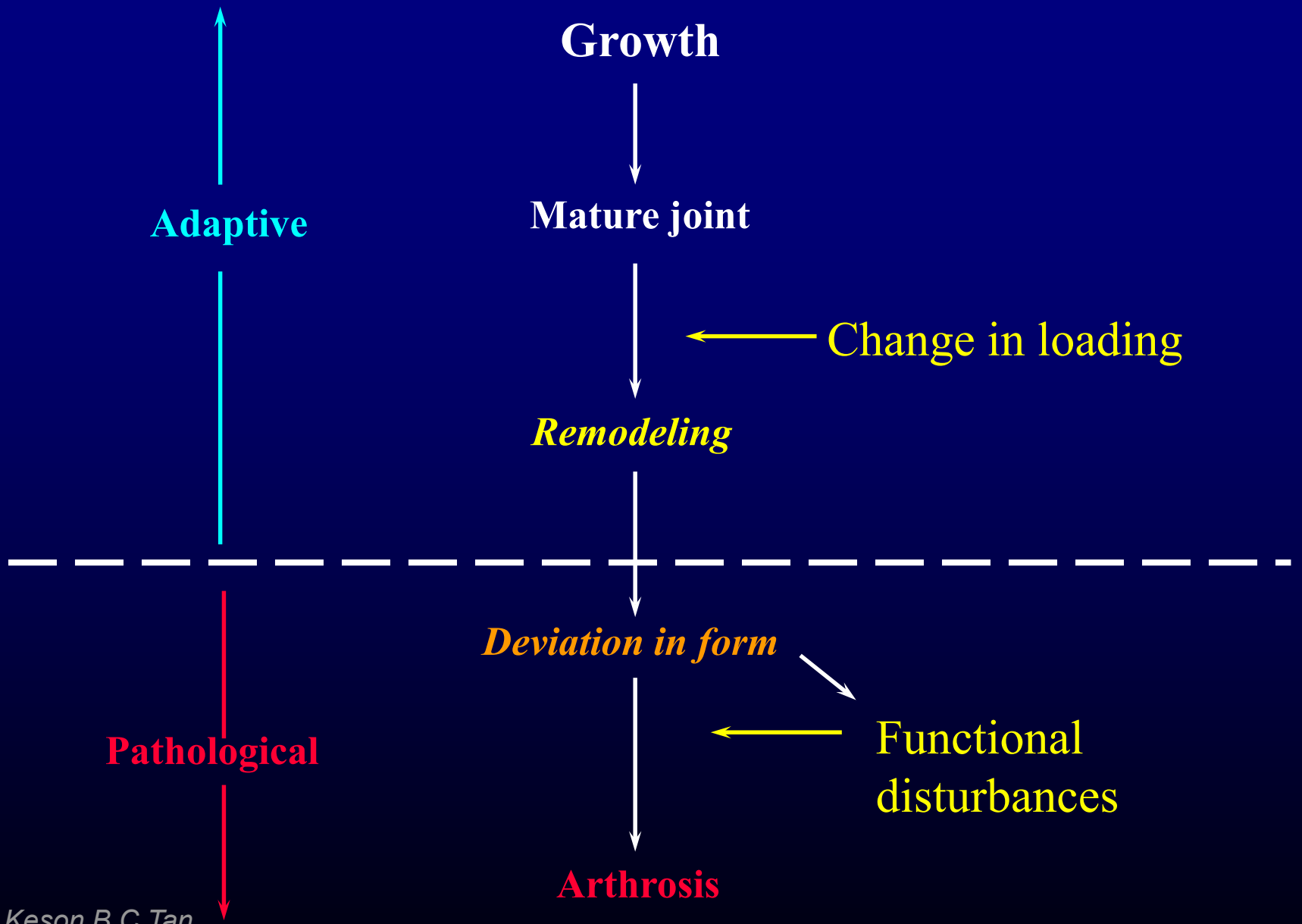
- Explanation and advice
- Range of dental methods

- Explanation and advice
- Limited use of irreversible dental methods
- Reversible dental methods (e.g., interocclusal appliance therapy)

- Explanation and advice
- Nondental methods
- Reversible dental methods



# Continuum of Morphological Changes in the TMJ



ORTHOFUNCTION

| | DEGREE OF ADAPTATION | FORM (Occlusion) | FUNCTION (Neuromuscular Response) |
|---|---|---|---|
| **Ideal Function** | No adaptation necessary | No occlusal interference | No Muscular Hyperactivity |
| **Normal Function** | Wide zone of adaptation | Occlusal Interferences<br>a. Interference with closure (IP, RCP, MCP)<br>b. excursive interferences<br>c. mandibular displacement | Minimal Muscular Hyperactivity |

## THRESHOLD

DYSFUCTION

**SUBLIMINAL SYMPTOMS**

Narrow zone of adaptation

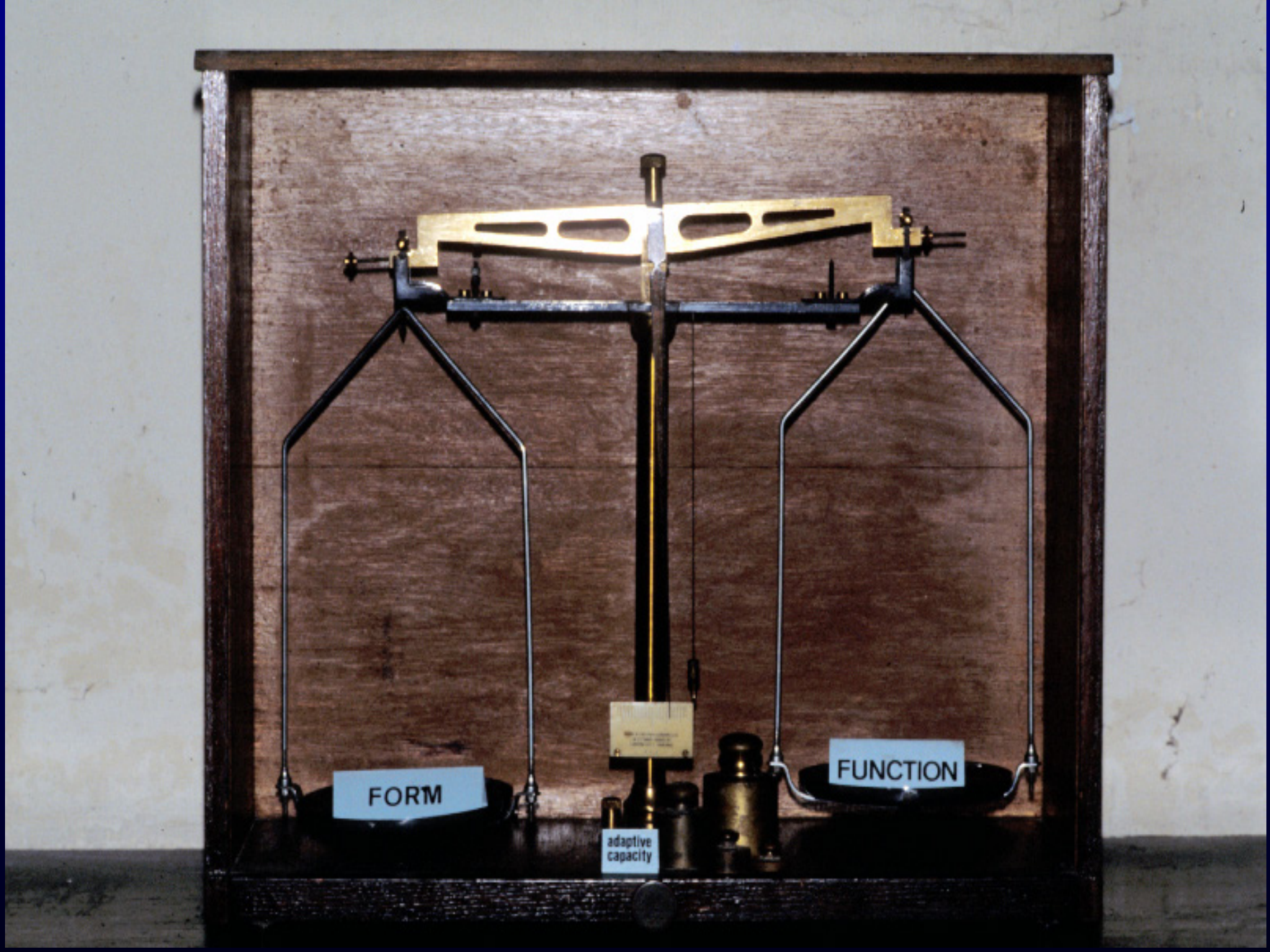
**FUNCTIONAL DISORDERS**
(tissue lesions)

a. Periodontium
b. Muscles
c. Joints

Uncontrolled adaptation

**FUNCTIONAL DISTURBANCES**
a. decreased function
b. spasm with fatigue
bruxism

Major or Minor Occlusal Interferences ↔ Increased Muscle Hyperactivity



No type of treatment ( except for obvious pulpitis) should be initiated on these patients until a thorough diagnostic work-up is completed and the symptomology under control.

Therefore, it is important for you to recognise craniomandibular signs and symptoms before proceeding with any treatment.

# No easy solutions – only intelligent choices

# Occlusal Therapy

- Any dental procedure that attempts to provide therapeutic results by altering the existing occlusal scheme

(a) Occlusal adjustment
(b) Orthodontics
(c) Fixed Prosthodontics
(d) Removable Prosthodontics
(e) Removable Splints
(f) Orthognathic Surgery

# Rationale of Occlusal Therapy

- To preserve, restore or maintain a state of Orthofunction in the Stomatognathic System
- By preventing or eliminating Disharmony between its components
- While lowering the Demands placed upon the System by other External Factors

# Occlusal Adjustments

# Occlusal Adjustment Therapy

Defn: The selective cutting or grinding of one or more teeth to achieve a stable, non-traumatic occlusal contact relationship between opposing teeth

**“Try to fit**
**a concept of occlusion to the mouth**
**rather than**
**forcing the mouth to fit the concept.”**

**“ In the interest of both the patient and the dentist, alteration of the occlusion should only be attempted for valid reasons and be done to the minimal extent required for the desired results in the individual patient.”**

# HOW

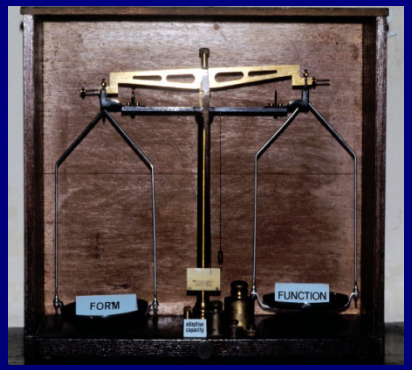
# VS

# WHY

**“The relationship between the data is more important than the data.”**

***James Burke***

***Scottish writer***




**Physiologic Tissue Response**
(Absence of Lesions)

**FORM**
(Structure)

- **Tooth Units**
- **Temporomandibular Articulation**

**FUNCTION**
(Behavior)

- **Neuromuscular performance**
- **CNS Modification**

Proliferation
Inflammation
Degeneration

**Trauma**
(microtraumatic lesions)

Controlled Adaptation

**ORTHOFUNCTION**
(Purposeful Function without injury)

Uncontrolled Adaptation

**DYSFUNCTION**
(Injury producing activity)

# Course Requirements

* Secure one set of stone Study Casts of your fellow classmate “patient”, which must be trimmed and finished.
* Demonstrate clinical proficiency in the use of the Arbitrary Facebow.
* Demonstrate clinical proficiency in obtaining Maxillomandibular Records and transferring them to a Semi-Adjustable Articulator for programming.

# Both orally and in written exercises

* Demonstrate knowledge of both the limitations and capabilities of a semi-adjustable articulator / arbitrary facebow transfer.
* Differentiate between functional jaw movements and border registrations used to program articulators.
* Discuss the significance of border position in oral rehabilitation procedures.
* Demonstrate how the articulator can be used both as a diagnostic tool and as an instrument to manufacture prostheses.
* Demonstrate the ability to perform simple occlusal analyses on articulator-related casts obtained from fellow classmates “patients”.

# Integrated Course in Occlusion

http://courses.nus.edu.sg/course/dentanbc/mainpage.htm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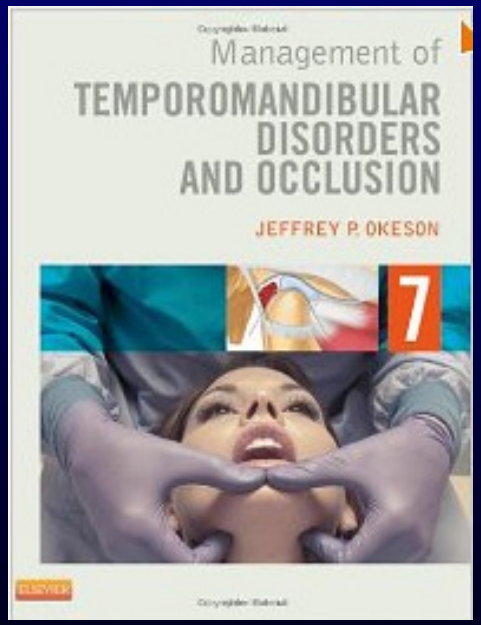
# *Recommended Text*

## Management of Temporomandibular Disorders and Occlusion

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Jeffrey P. Okeson