



Non-Speech Oral Motor Exercises: Evidence and Discrepancies

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Purpose

The debate about non-speech oral motor exercises (NS-OMEs) has been a hot one in the field of speech-language pathology. We took a two-pronged approach to the issue by reviewing clinicians' perceptions and beliefs about how and why NS-OMEs work, combined with a basic review of the physiological effects of exercise as they apply to the articulators. In particular, we reviewed strength, range of motion, and coordination, as these factors are frequently identified as targeted outcomes for NS-OMEs.

Background

- ❖ Current research does not provide clinicians with definitive answers regarding the value of NSOMEs for the remediation of speech sound disorders (SSDs).
- ❖ "The existing research literature provides insufficient evidence to support or refute the use of nonspeech OMEs" (McCauley et al., 2009, p. 353).
- ❖ Lof and Watson (2008) found, in a national survey, that 85% of SLPs working with children with speech sound disorders (SSDs) use NSOMEs.
- ❖ NSOMEs are known by many names for the various exercises to remediate SSDs..mouth exercises, nonspeech oral motor training, tongue exercises, and oral motor treatment
- ❖ **Exercise** is the common denominator in this debate. Research has not provided clear guidance as to which, if any, exercises have clinical value. In light of this shortcoming, clinicians need to understand the physiological consequences of exercise so they can make informed decisions about NSOMEs.
- ❖ Clark (2003) proposed that SLPs should understand how exercise alters four physiological parameters: **strength, endurance, power, and range of motion**. However, many SLPs may not remember what they learned in A&P101 about cellular level changes that occur in response to exercise.

Evidence for NS-OMEs

No peer-reviewed studies published supporting the use of NS-OMEs to remediate speech sound disorders.

Only one study. . .
Polmanteer, K., & Fields, D. (2002, Nov.) Effectiveness of oral motor techniques in articulation and phonology treatment. Poster session presented at the annual convention of the American Speech-Language-Hearing Association, Atlanta, GA

Evidence against NS-OMEs

- Lass & Pannbacker (2008) reviewed the literature on NSOMEs and concluded that "sufficient evidence does not exist for NSOMTs" [nonspeech oral motor treatment] effectiveness in improving speech, and therefore NSOMTs should be excluded from use as a mainstream treatment" (pg. 418). *Language, Speech and Hearing Services in Schools*, 39, 408-421.
- Colone & Forrest (2002, Nov.) Comparison of treatment efficacy for persistent speech disorders. Poster session presented at the ASHA annual convention, Washington, D.C.
- Lof & Watson (2008) A nationwide survey of nonspeech oral motor exercise use: Implications for evidence based practice. *LSHSS*, 39, 392-407.
- MORE AVAILABLE. . .

Anatomy & Physiology

Strength vs. Coordination

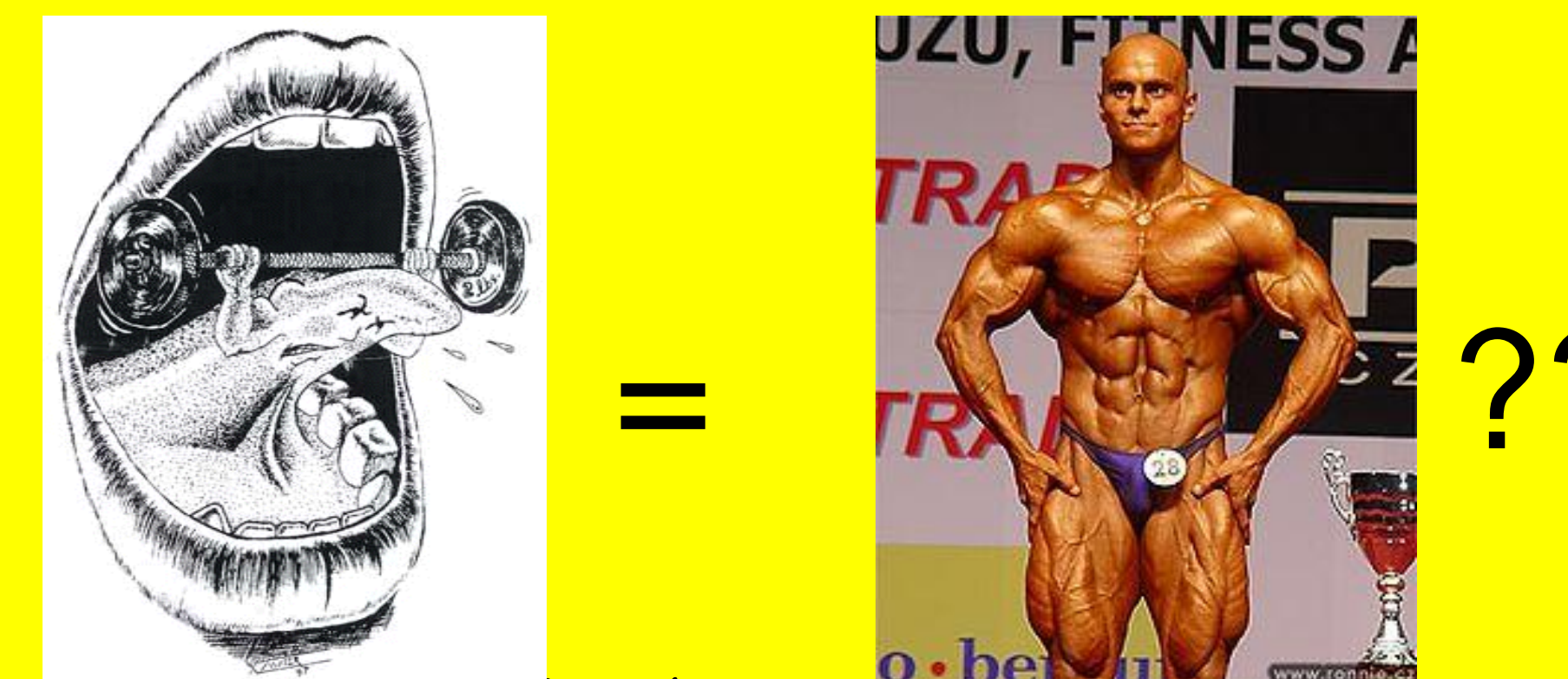
Can oral muscles, in particular the tongue, be changed through exercise?

Overload principle: "If muscle performance [strength] is to improve, a load that exceeds the metabolic capacity of the muscle must be applied; that is, the muscle must be challenged to perform at a level greater than that to which it is accustomed" (Kisner & Colby, 2007, *Thx Exercises: Foundations and Techniques*).

Yes. Exercises can make the tongue stronger (Lazarus et al., 2003; Steele et al., 2009), but will stronger articulators produce more accurate articulation?

Is the tongue like other voluntary muscles? Yes. . . and No.

- § Strengthened through the process of hypertrophy.
- § Movements for speech (elevation, placement, & pressure) likely employ both extrinsic and intrinsic muscles (Steele et al., 2009).
- § Unique muscle fiber patters, ex: imbricated – like overlapping fish scales; interdigitated – intermingling (Hixon, Weismer, & Hoit (2008), produce a wide range of motion.
- § Muscle spindles (related to muscle tone) are not consistently found in the tongue (Cooper, 1960; Neilson, Andrews, Guitar, & Quinn, 1979; as reported in Clark, 2003).
- § Unique sensory-motor feedback system



Don't worry!!!

SLPs are not always clear about whether they are using exercises to improve strength OR coordination – which are related, but not the same, functions.



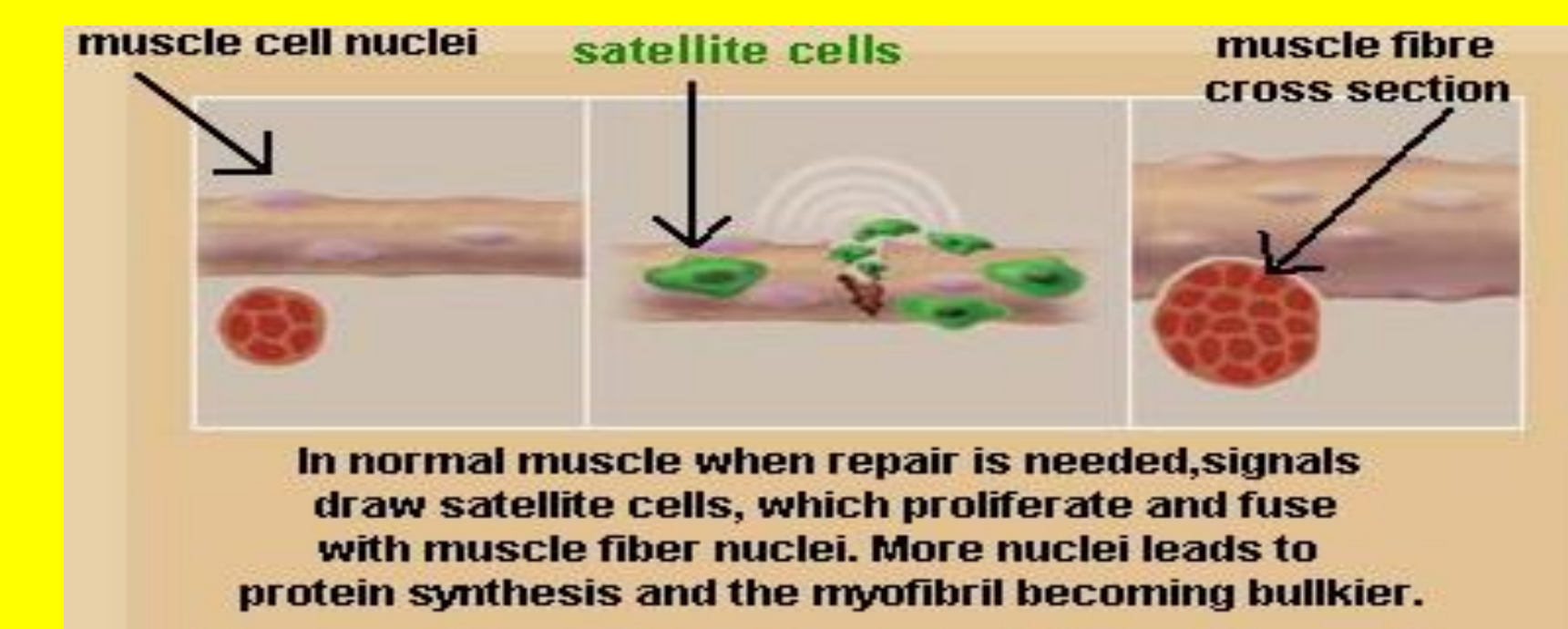
What is strength?

The ability to apply or withstand force.

Biting Strength = The amount of force the muscles of mastication are capable of exerting. <http://medical-dictionary.thefreedictionary.com/strength>

Articulatory strength = ?

How do muscles get stronger? Hypertrophy
 Micro-tears – release growth factor
 Satellite cells proliferate
 Migrate to muscle & enter sarcolemma
 Repair damage, donate nucleus, & lay down new proteins - **Voila! A bigger muscle** -
But, is it more useful?



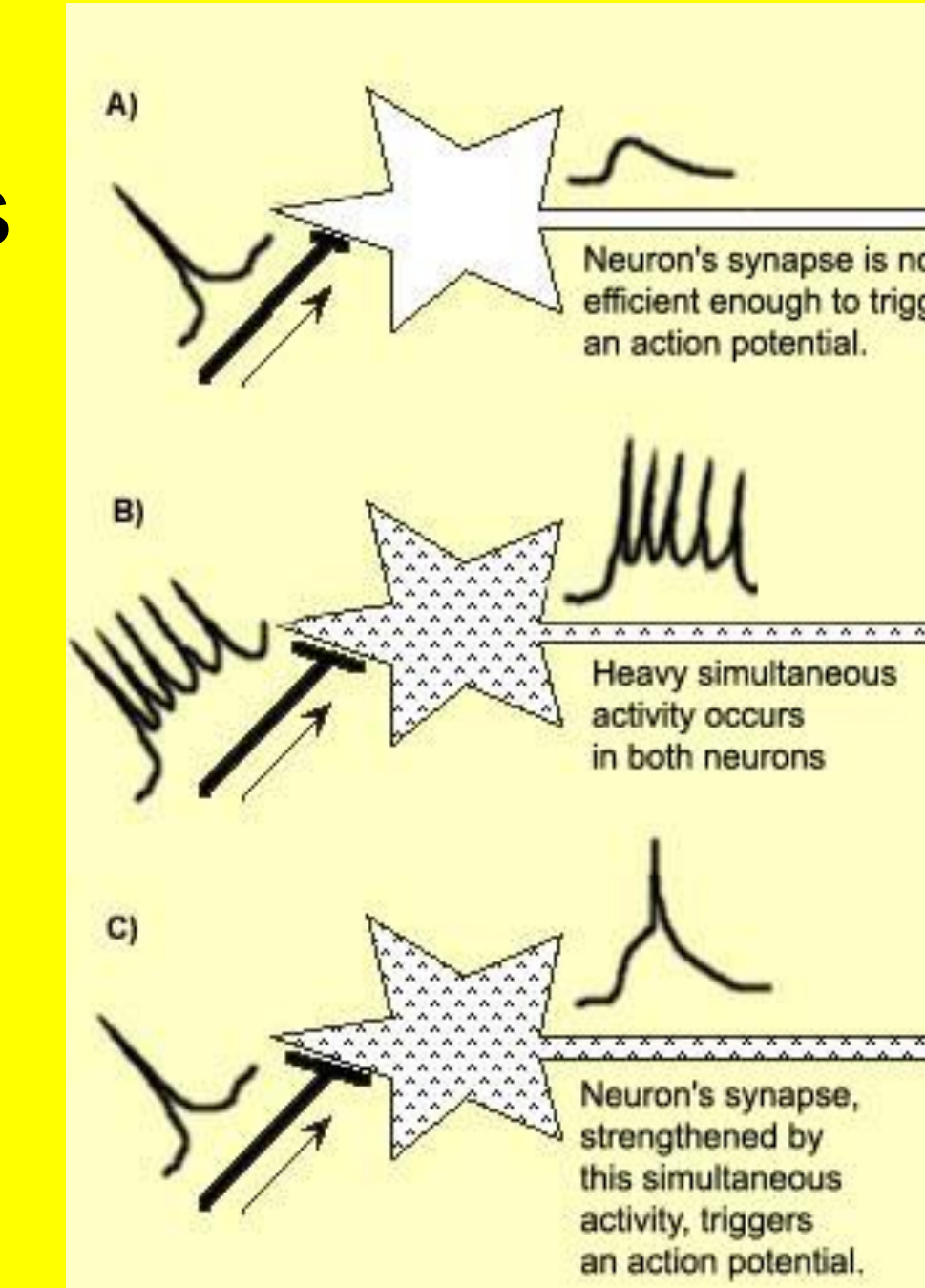
<http://www.bio.miami.edu/~cmallery/150/neuro/normal.muscle.jpg>

Coordination: "The organization of control of motor units" (Carson, 2007)

Positive effects from training are most likely when the specific muscle activation patterns - reinforced through practice - are also those required in the target task context.

"Neurons that fire together wire together." (Hebb)

**Practicing erroneous muscle movement = Excellent erroneous muscle movement!
Habitual reinforcement - TASK SPECIFIC!**



What about populations with atypical muscle development or maintenance?

In regard to conditions that result in reduced muscle mass (MD, cachexia, low tone, etc.): "Muscle wasting and weakness are among the most common inherited and acquired disorders . . . There is no generally accepted treatment to improve muscle bulk and strength." Schuelke et al., (2004) in *the New England Journal of Medicine*

McCauley, Strand, Lof, Schooling, & Frymark (2009). Evidence-based systematic review: Effects of nonspeech oral motor exercises on speech. *AJSLP*, 18, 343-360.

- ❖ Articles from 1960-2007 (47 years)
- ❖ 15 met criteria (out of 899 potential citations)
- ❖ Considerable variations
- ❖ Not enough evidence to support or refute the use of NS-OMEs
- ❖ The bottom line is not clear!



Concluding Thoughts

What can a clinician do? If you choose to use NS-OMEs:

1. Understand the physiology: Muscle strengthening – overload principle
2. What's really needed?
 - More strength?
 - Recruitment of additional motor units?
 - More strength?
 - Recruitment of available/alternative motor units?
 - Development of a new pattern of movement?
3. Document – Use objective measurements of
 - Strength
 - Range of motion
 - Stimulability
 - Change over time

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