



ScienceDirect

Access through your institution

to view subscribed content **from home**

Outline



Get Access

Share

Export

## Brain and Cognition

Volume 81, Issue 3, April 2013, Pages 376-381

## Effects of chewing on cognitive processing speed

Yoshiyuki Hirano <sup>a, b</sup> , Takayuki Obata <sup>a, b, c</sup> , Hidehiko Takahashi <sup>c</sup> , Atsumichi Tachibana <sup>d</sup> , Daigo Kuroiwa <sup>a</sup> , Toru Takahashi <sup>e</sup> , Hiroo Ikehira <sup>c</sup> , Minoru Onozuka <sup>d</sup>

[Show more](#) <https://doi.org/10.1016/j.bandc.2012.12.002>[Get rights and content](#)

## Abstract

In recent years, chewing has been discussed as producing effects of maintaining and sustaining cognitive performance. We have reported that chewing may improve or recover the process of working memory; however, the mechanisms underlying these phenomena are still to be elucidated. We investigated the effect of chewing on aspects of attention and cognitive processing speed, testing the hypothesis that this effect induces higher cognitive performance. Seventeen healthy adults (20–34 years old) were studied during attention task with blood oxygenation level-dependent functional (fMRI) at 3.0 T MRI. The attentional network test (ANT) within a single task fMRI containing two cue conditions (no cue and center cue) and two target conditions (congruent and incongruent) was conducted to examine the efficiency of alerting and executive control. Participants were instructed to press a button with the right or left thumb according to the direction of a centrally presented arrow. Each participant underwent two back-to-back ANT sessions with or without chewing gum, odorless and tasteless to remove any effect other than chewing. Behavioral results showed that mean reaction time was significantly decreased during

chewing condition, regardless of speed-accuracy trade-off, although there were no significant changes in behavioral effects (both alerting and conflict effects). On the other hand, fMRI analysis revealed higher activations in the anterior cingulate cortex and left frontal gyrus for the executive network and motor-related regions for both attentional networks during chewing condition. These results suggested that chewing induced an increase in the arousal level and alertness in addition to an effect on motor control and, as a consequence, these effects could lead to improvements in cognitive performance.

## Highlights

► Chewing accelerates cognitive processing speed. ► [fMRI](#) BOLD response in the anterior cingulate and left frontal [gyrus](#) for executive network after chewing. ► Chewing affects motor-related brain regions for attentional network test.



## Keywords

Chewing; Attention; Attentional networks; Alerting; Executive function; Functional MRI

---

[Recommended articles](#)

[Citing articles \(46\)](#)

[View full text](#)

Published by Elsevier Inc.



[About ScienceDirect](#)

[Remote access](#)

[Shopping cart](#)

[Advertise](#)

[Contact and support](#)

[Terms and conditions](#)

[Privacy policy](#)

We use cookies to help provide and enhance our service and tailor content and ads. By continuing you agree to the **use of cookies**.

Copyright © 2020 Elsevier B.V. or its licensors or contributors. ScienceDirect® is a registered trademark of Elsevier B.V.

ScienceDirect® is a registered trademark of Elsevier B.V.

