Geoclimatological Impacts on Linguistic Terminology & Evolution: A Case Study in Arabic Color Terminology

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BACKGROUND

PURPOSE

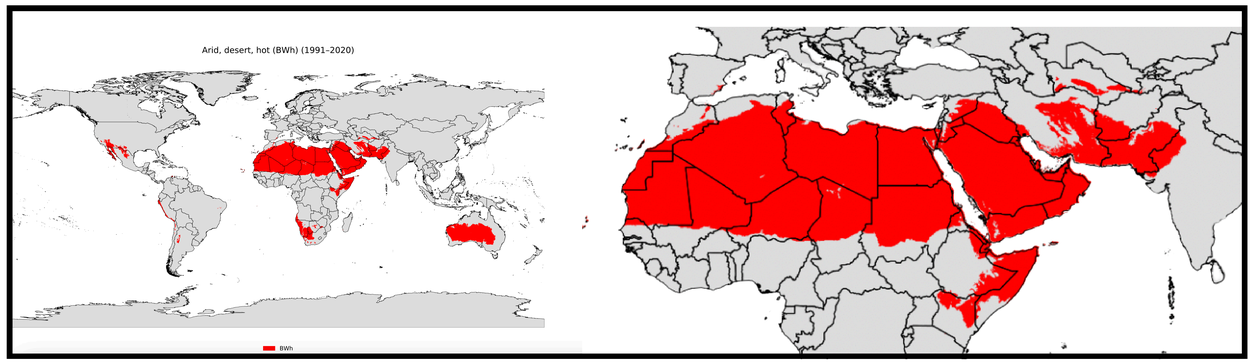
Understanding of **color terminology** shifts = further understanding of **climate influence** on human behavior = **future adaptation hypotheses**

LANGUAGE

Modern Standard Arabic (MSA) | 380M native speakers | Official language in 22 countries | 11 basic color terms

CLIMATE

ARID/DESERT/HOT [BWh] | WARM summers + winters [highs of 110-115° F] / little to no vegetation / extremely low precipitation + humidity / current trends projected↑



Global regions classified as B under the Köppen-Geiger scale. Credit: By Maulucioni, based on a previous work by Beck, H.E. et al., 2018 - Own work, derived from File:Koppen-Geiger Map B present.svg, CC BY-SA 4.0, https://commons.wikimedia.org/w/index.p

METHODS / OBJECTIVES

1. **Analyze current + future climate of the MENA region [Oman]**
2. **Examine MSA response to climate variables**
3. **Propose theoretical geoclimatic drivers of observable linguistic changes in MSA's 11 color terms**

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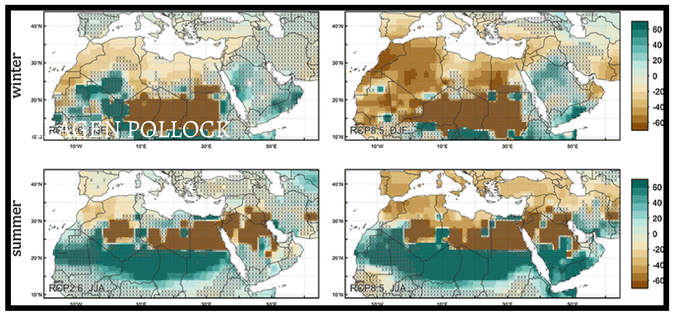
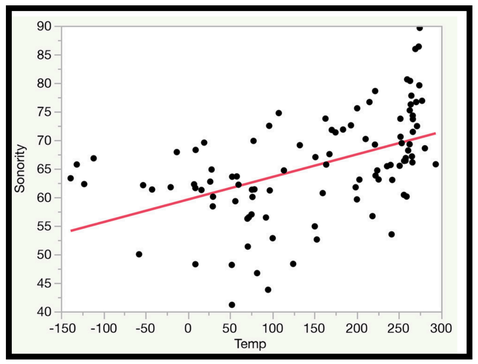
RESULTS & DISCUSSION



Percent change in precipitation in winter vs. summer for two climate scenarios in the MENA region. Credit: Waha et al., 2017

OBJECTIVE 1

- **P: AtmAI & IVP-T**
- **AHE: Saharan/Arabian pressure systems fusion -> higher moisture/dust load**
  - **NAO anomaly (+CO_2) -> AtmAI increase**
- **SWE: ITCZ increasing IVP-T rates in south MENA-> climate events affected by EF: evapotranspiration**
- **HWI +1.33°C/decade |Atm T +0.04 K year-1 |SLP -0.016 hPa year-1**



Maddieson sonority score demonstrating the link between sonority and temperature ratings for 100 tested languages. Credit: Maddieson, I., 2018

OBJECTIVE 2

- **AAH: environmental constraints affect signal propagation**
- **Larger phoneme inventory/complexity = high vegetation / mean annual T / insolation | low altitude**
- **Insignificant % of quantized obstruent consonant clusters**
- **Phonemic alteration [via root tri/quadrilateralization] = response to fluctuating temperature and high humidity within the region**

OBJECTIVE 3

- **Current + future climate projections of the MENA region show increased + intensified climate patterns**
- **MSA evolved in response to climate [temperature, humidity, precipitation] through word structure and sound adaptations**

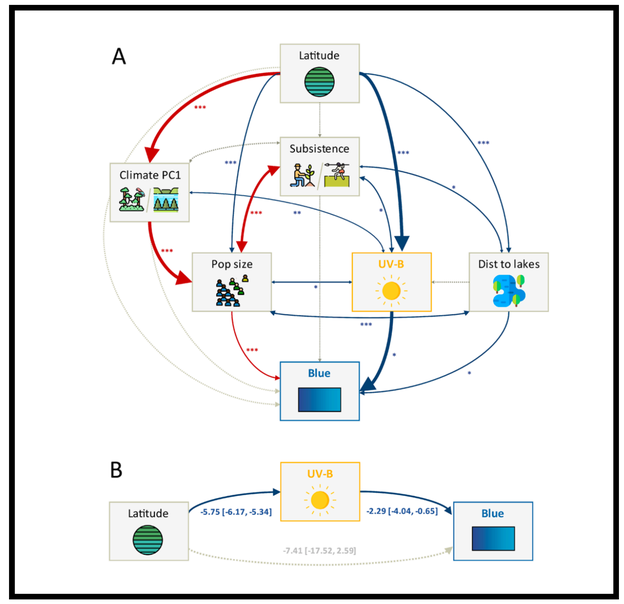


Diagram of experimental results showing evidence that UV incidence, latitude, and distance to bodies of water have a strong correlation with the presence of an individual lexical category for blue in languages worldwide.
Credit: Josserand, M., Meeussen, E., Majid, A., and Dediu, D., 2021

- **Theoretical geoclimatic drivers of observable linguistic changes in MSA's 11 color terms include desertification, hydrologically significant climate events, and geological evolution of oases, coastlines, rivers, etc.**
  - **More terms for water/BLUE term based on water physicality**
  - **GREEN term based on vegetation concentration + diversity**