

## A TAXONOMY OF IMPLICIT CAUSALITY IN 112 TURKISH INTERPERSONAL VERBS

Oktay ÇINAR\*

**Abstract:** The objective of this study is to develop a comprehensive taxonomy of 112 Turkish interpersonal verbs that denote implicit causality. This taxonomy is categorized into four distinct verb types: Stimulus-Experiencer (SE), Experiencer-Stimulus (ES), Agent-Patient (AP), and Agent-Evocator (AE), each comprising 28 verbs exemplifying its respective characteristics. The primary aim is to establish a representational scale for each category. The selection of verbs is informed by cross-linguistic studies that encompass a variety of verb types across different categories. To examine implicit causality biases associated with these verbs, a sentence completion task was employed. Participants were asked to complete sentences such as “Ali Ayşe’yi korkuttu çünkü ...” (Ali scared Ayşe because ...) to assess the causal attributions linked to each verb. The study also investigates the interaction between verb type, the gender of the participant, and the gender of referents in the sentences. The findings indicate that previous research on the implicit causality biases of verbs can be extended to Turkish. This classification serves as a foundational framework for future research, enabling a more systematic investigation of implicit causality in Turkish interpersonal verbs.

**Keywords:** Implicit causality, interpersonal verbs, verb semantics, verb taxonomy, Turkish.

### Türkçe Kişilerarası 112 Eylemde Örtük Nedensellik Taksonomisi

**Öz:** Bu çalışmanın amacı, örtük nedensellik bildiren Türkçe kişilerarası 112 eylemin kapsamlı bir taksonomisini geliştirmektir. Bu taksonomi, her biri kendi özelliklerini yansıtan 28 eylemden oluşan dört farklı türe ayrılmıştır: Uyarıcı-Deneyimleyen (Stimulus-Experiencer, SE), Deneyimleyen-Uyarıcı (Experiencer-Stimulus, ES), Etken-Etkilenen (Agent-Patient, AP) ve Etken-Uyandırıcı (Agent-Evocator, AE). Çalışmanın temel amacı, her kategori için temsili bir ölçek oluşturmaktır. Eylemlerin seçimi, farklı kategorilerde çeşitli eylem türlerini kapsayan dillerarası çalışmalardan yararlanılarak yapılmıştır. Bu eylemlerle ilişkili örtük nedensellik yargılarını incelemek için bir cümle tamamlama testi uygulanmıştır. Katılımcılardan, her eyleme bağlı nedensellik gönderimlerini değerlendirmek amacıyla, “Ali Ayşe’yi korkuttu çünkü ...” gibi cümleleri tamamlamaları istenmiştir. Çalışma aynı zamanda eylem türü, katılımcının cinsiyeti ve cümlelerdeki göndergelerin cinsiyeti arasındaki etkileşimi de araştırmaktadır. Bulgular, eylemlerin örtük nedensellik yargıları üzerine yapılan önceki araştırmaların Türkçeye de uyarlanabileceğini göstermektedir. Bu sınıflandırma, gelecekte yapılacak çalışmalara temel

\* Dr. Öğr. Üyesi, İstanbul Medeniyet Üniversitesi, Edebiyat Fakültesi, Dilbilimi Bölümü, İstanbul/Türkiye, e-posta: oktay.cinar@medeniyet.edu.tr, ORCID: 0000-0002-9822-7574.

*sağlayarak Türkçe kişilerarası eylemlerde örtük nedenselliğin daha sistematik biçimde incelenmesine olanak tanımaktadır.*

**Anahtar Sözcükler:** Örtük nedensellik, kişilerarası eylemler, eylem anlambilimi, eylem taksonomisi, Türkçe.

## Introduction

Causality is a fundamental cognitive capacity that enables individuals to understand, predict, and respond to the world around them (e.g., Zheng et al., 2020). One key aspect of causal reasoning in language is how causality is assigned to different participants in an event, particularly through the semantics of interpersonal verbs (Garvey & Caramazza, 1974; Caramazza et al., 1977). Research has shown that some verbs systematically assign causality to the subject of the sentence, while others attribute it to the object (Au, 1986; Rudolph & Försterling, 1997). For instance, the verb *frighten* tends to assign causality to the subject, whereas *fear* attributes causality to the object:

(1) Harry frightened Thomas because he suddenly shouted.

(2) Harry feared Thomas because he suddenly shouted.

In (1), speakers interpret the cause of the event as the grammatical subject (*Harry*), whereas in (2), causality is assigned to the grammatical object (*Thomas*). This systematic relationship between verb semantics and causal attribution is known as implicit causality (IC; Garvey & Caramazza, 1974). Accordingly, *frighten* exhibits an NP1 bias, as causality is linked to the subject, whereas *fear* demonstrates an NP2 bias, attributing causality to the object. While IC is not a rigid grammatical constraint, it reflects a cognitive preference that speakers exhibit when assigning causality in discourse (Solstad & Bott, 2022).

Causality, as a broader phenomenon, is extensively studied across multiple disciplines, including linguistics, psychology, and sociology. It plays a crucial role in cognitive and communicative processes such as discourse comprehension (e.g., Garrod & Terras, 2000; McKoon & Ratcliff 1989; Trabasso & van den Broek, 1985), anaphora resolution and discourse coherence (Kehler, 2002; Bott & Solstad, 2021). Additionally, it is relevant for understanding social hierarchies and gender roles (e.g., Hartshorne, 2014; LaFrance et al., 1997; Corrigan, 2001; Ferstl et al., 2011). Studies on implicit causality have further explored its role in child language development (Au, 1986; Corrigan & Stevenson, 1994; Goikoetxea et al., 2008) and its cross-linguistic variations (e.g., Bott & Solstad, 2014).

To investigate IC effects, researchers have employed various experimental methodologies. In sentence production tasks, participants complete sentences containing an interpersonal verb followed by *because* (e.g., Au, 1986; Brown & Fish, 1983), revealing the causal attribution tendencies. Comprehension tasks assess how readers process IC-consistent and IC-inconsistent sentences, showing that congruent IC biases facilitate faster processing (e.g., Garnham & Oakhill, 1985; Garnham et al., 1992; Caramazza et al., 1977; McKoon et al., 1993). Additionally, corpus-based studies have examined IC effects in natural language use (Long & De Ley, 2000; Anting Tan et al., 2022), highlighting how causal biases manifest in real-world communication.

Efforts to classify verbs according to their IC bias date back to Garvey and Caramazza (1974). The first systematic classification, proposed by Brown and Fish (1983), distinguished between action verbs and state verbs. Action verbs, also termed as Agent-Patient (AP) verbs, involve an Agent (NP1) responsible for the event. Examples include

*hit*, *call*, and *push*, where the subject initiates and controls the action. For example, in *John hit Mary*, John is the Agent responsible for the event, making *hit* an NP1-biased verb.

State verbs, also known as psych verbs, describe psychological states and can be categorized into two subtypes: Stimulus-Experiencer (SE) verbs and Experiencer-Stimulus (ES) verbs. In both categories, the Stimulus functions as the argument that carries causality, determining the direction of the event structure. In SE verbs, such as *annoy*, *scare*, and *humiliate*, the Stimulus appears as the subject and is responsible for the event, leading to an NP1 bias. Conversely, in ES verbs, such as *fear*, *to feel hurt*, and *love*, the Stimulus appears as the object and is responsible for the event, resulting in an NP2 bias. For example, in the sentence *John annoyed Mary*, *John*, as the Stimulus, causes the psychological state, demonstrating an NP1 bias. In contrast, in *John feared Mary*, *Mary*, as the Stimulus, triggers the psychological state, indicating an NP2 bias.

While many AP verbs exhibit NP1 bias, Rudolph and Försterling (1997) introduced an additional classification: Agent-Evocator (AE) verbs. Unlike AP verbs, AE verbs involve an Agent but assign causality to NP2. Verbs such as *criticize* and *respond* fall into this category, as they imply that the action is prompted by another individual. For example, in *John criticized Mary*, *Mary's* actions led to *John's* criticism, making her responsible for the event and resulting in an NP2 bias.

Cross-linguistic studies (e.g., Goikoetxea et al., 2008; Ferstl et al., 2011) have supported a four-way classification system for IC biases. This framework categorizes verbs into AP verbs, which exhibit an NP1 bias; AE verbs, which exhibit an NP2 bias; SE verbs, which exhibit an NP1 bias; and ES verbs, which exhibit an NP2 bias. This classification provides a structured approach to understanding how causality is assigned across different verb types and languages.

Building on this body of research, the present study aims to develop a comprehensive taxonomy of Turkish interpersonal verbs that exhibit IC biases. By systematically categorizing these verbs into four distinct types—Stimulus-Experiencer (SE), Experiencer-Stimulus (ES), Agent-Patient (AP), and Agent-Evocator (AE)—this study seeks to establish a representational scale for IC in Turkish. Through a sentence completion task, I investigate the extent to which IC biases in Turkish align with findings from cross-linguistic studies.

The following section delves deeper into the phenomenon of IC, examining its theoretical foundations, methodological approaches, and cognitive effects. By exploring how IC biases are shaped by different factors, this section provides a comprehensive overview of how IC has been studied across languages and experimental paradigms.

### 1. Implicit Causality (IC)

Most studies agree on four main categories of verbs (i.e., SE, ES, AP, and AE) that govern IC bias. However, the underlying cause of IC bias remains an open question. Various theoretical accounts have attempted to explain IC effects, with the central debate focusing on whether IC bias arises from the linguistic properties of verbs and the syntactic structure of sentences or whether it is influenced by external factors such as social context. The foundational work of Garvey and Caramazza (1974) linked causality to verb semantics, demonstrating that specific IC verbs shape pronoun resolution by biasing coreference toward either the subject or the object. According to their findings, this bias is not a grammatical constraint but rather a pragmatic preference. Subsequent studies (e.g., Au, 1986; Brown & Fish, 1983) have supported this view, arguing that IC

effects are primarily dependent on lexical properties rather than social or cognitive factors.

Conversely, research on gender and social dominance relations suggests that world knowledge may shape IC biases. Some studies claim that participant characteristics, such as social status and gender, influence IC bias. For instance, findings indicate that men are more likely to be attributed causality, while women are more often perceived as respondents (LaFrance et al., 1997; Ferstl et al., 2011). Similarly, Corrigan (2001) demonstrated that the semantic properties of nouns within a sentence can influence causality bias, with agentive nouns (e.g., *manager*) being perceived as more causally active than others (e.g., *client*). Some studies have also suggested that verb's emotional valence—whether a verb carries a positive or negative connotation—can shape IC biases, with negative verbs perceived as stronger initiators of causality. However, this finding has not been consistently replicated, with some studies failing to establish a clear correlation between verb valence and IC bias (Rudolph & Försterling, 1997). Moreover, the influence of gender has been similarly inconsistent. While some studies (e.g., LaFrance et al., 1997) found an effect of gender reference on causality perception, others (e.g., Goikoetxea et al., 2008; Hartshorne, 2014) reported that social status and gender do not significantly influence coreference biases in IC effects.

From a theoretical perspective, many accounts of IC bias link it to the argument structure of verbs. According to this view, verbs assign roles to their arguments, and certain argument roles, such as Agent and Stimulus, are inherently causal (Brown & Fish, 1983; Levin & Rappaport Hovav, 2005; Crinean & Garnham, 2006). Supporting this, Brown and Fish (1983) demonstrated that IC bias persists even when an active sentence is transformed into the passive voice, suggesting that syntactic structure—whether an argument appears as a subject or object—does not influence IC bias, whereas thematic roles do. Their findings imply that the Agent-Patient and Stimulus-Experiencer schemas are universal cognitive structures that govern causality attribution across languages.

Other theoretical accounts propose that verb semantics alone determine IC bias (Hartshorne, 2014; Hartshorne & Snedeker, 2013). These studies argue that the meaning of a verb, rather than world knowledge, is the primary factor shaping IC effects. While some researchers claim that IC bias is categorical and strictly determined by verb thematic structure (e.g., Crinean & Garnham, 2006), others suggest that IC bias is probabilistic, with some verbs exhibiting only weak biases. Rudolph and Försterling (1997) found that not all agents necessarily assign causality to NP1, and additional studies have shown that certain descriptive action verbs do not carry a consistent causality bias (e.g., Mannetti & De Grada, 1991; Semin & Fiedler, 1988). Furthermore, some researchers argue that IC bias is not only affected by verb thematic structure but also by contextual information, emphasizing the role of discourse factors in causality attribution (Pickering & Majid, 2007).

A broader approach considers IC bias within discourse coherence theories, suggesting that IC is not an isolated phenomenon but part of a general framework of discourse expectations. According to this perspective, discourse structure shapes IC bias, as the presence or absence of specific discourse cues influences causality attribution. For example, Kehler et al. (2008) found that when participants encountered IC verbs in contexts without an explicit causal connective (e.g., *because*), they still inferred causality and provided explanations as if a connective had been present. This suggests that IC

verbs inherently guide coherence biases (Bott & Solstad, 2021), functioning as discourse cues that shape how subsequent information is interpreted.

The role of connectives in IC bias has also been explored. Stevenson et al. (1994) proposed that different connectives influence pronoun resolution and IC bias. Specifically, *because* implies causality, whereas *so* implies consequentiality. Therefore, the use of *because* in IC experiments reinforces causality interpretations rather than consequential ones (e.g., Stewart et al., 1998; Garnham et al., 2021; Solstad & Bott, 2022). However, as noted earlier, even in the absence of an explicit causal connective, participants still infer causality based on the verb's IC bias, suggesting that verb meaning plays a dominant role in causal attribution.

A more recent theoretical perspective has been introduced by Solstad and Bott (2022, 2023), who propose a semantic-compositional approach. According to this view, IC bias does not stem from argument structure but from the semantic properties of verbs and discourse explanation patterns. They argue that IC verbs inherently lack causal information, creating an empty slot in their meaning. This missing content is then linked to one of the verb's arguments, which triggers an anaphoric bias and generates an expectation for explanation. As a result, IC verbs favor explanatory discourse continuations. For example, in psych verbs, the Stimulus attracts causality-related biases, whereas in active verbs, the Evocator plays this role.

Despite the progress in understanding IC bias, certain inconsistencies remain, particularly regarding verb classifications. While psych verbs have shown relatively stable IC biases, action verbs might exhibit variability. Bott and Solstad (2014) found that, unlike psych verbs, AP verbs do not display a consistent IC bias, likely because action verbs inherently encode causal information and do not presuppose a reason for the action. Such findings align with earlier studies that have noted the variability of IC bias among action verbs (Rudolph & Försterling, 1997; Mannetti & De Grada, 1991; Semin & Fiedler, 1988). This variability suggests that while psych verbs follow clear IC patterns, action verbs may be more susceptible to external influences such as discourse context, world knowledge, and verb-specific semantics.

In summary, while IC bias has been widely studied across languages and experimental paradigms, its underlying mechanisms remain a topic of debate. Theoretical accounts range from strictly linguistic perspectives that attribute IC bias to verb semantics and argument structure to broader discourse-based and social cognition perspectives that emphasize contextual and extralinguistic factors.

## 2. Present Study

IC biases of verbs have been widely utilized across various fields, particularly in psychological, cognitive and linguistic research. However, while IC biases have been extensively investigated in studies, previous research has often relied on a limited set of verbs, with considerable variation in the specific verbs examined. This variability reduces the reliability and generalizability of findings, as studies indicate that IC biases and the representational scale for each verb can fluctuate (Rudolph & Försterling, 1997; Goikoetxea et al., 2008). Cross-linguistic research has addressed this issue by developing normative IC datasets for different languages, focusing on a larger number of verbs and broader participant samples. For instance, Goikoetxea et al. (2008) established IC norms for Spanish, while Hartshorne & Snedeker (2013) conducted a similar study for English.

These studies provide a systematic foundation for examining IC biases across different linguistic contexts.

Despite the extensive research on IC in various languages, no systematic study has been conducted on Turkish to establish IC biases for interpersonal verbs. Consequently, there is no available reference framework to determine how IC verbs should be categorized or utilized in linguistic research on Turkish. The absence of such a framework poses a challenge for future studies aiming to investigate IC effects in Turkish, as researchers lack standardized norms for verb biases. Therefore, establishing comprehensive IC norms for Turkish is essential to facilitate further research and ensure methodological consistency in studies on causal attribution.

Given the importance of understanding IC effects, it is crucial to establish verb-specific IC norms that can be consistently applied across studies. Moreover, previous research has suggested that social context, particularly gender, can influence IC bias. The gender of the referents in the sentence (NP1 and NP2) and the participant's gender may play a role in shaping causal attributions. However, the extent of this influence remains underexplored in most studies.

Considering this, the present study aims to address these gaps by systematically assessing the IC biases of Turkish interpersonal verbs. To achieve this, a representational scale will be established for each verb to determine the extent to which it conforms to its expected IC bias. Furthermore, the study incorporates gender as a variable, examining how the gender of NP1, NP2, and the participant influences causal attributions. By analyzing these interactions, this research seeks to provide a comprehensive framework for understanding IC in Turkish, contributing to broader discussions on IC biases across languages.

### 3. Methodology

This study examines the IC biases of Turkish interpersonal verbs, aiming to develop a representational scale for each verb to measure how closely it aligns with its anticipated IC bias. Additionally, the study explores the role of gender, both in terms of the participants and the referents in the sentence. A single experiment was conducted using a sentence completion task to investigate the interaction between verb type, participant gender, and referent gender. Participants were asked to complete sentences with an interpersonal verb followed by the connective *çünkü* (because) to determine causality preferences.

#### 3.1. Participants

The participants were 154 native speakers of Turkish, recruited from various departments of İstanbul Medeniyet University. Among them, 94 were women and 60 were men. Participation was voluntary, and no monetary compensation or course credit was provided. Ethical approval for this study was granted by the İstanbul Medeniyet University Social and Humanities Ethics Commission under the decision number 2025/2, dated February 25, 2025. Informed consent was obtained from all participants prior to the commencement of the study.

#### 3.2. Materials

The study investigates IC biases in Turkish verbs and focuses on how verb types interact with participant and referent gender in causal sentence completions. The analysis

aimed to determine which entity (NP1: subject vs. NP2: object) was preferred as the cause in causal attributions.

A total of 112 interpersonal verbs were selected based on their established IC bias. These verbs were categorized into four types: Stimulus-Experiencer (SE), Experiencer-Stimulus (ES), Agent-Patient (AP), and Agent-Evocator (AE). The verbs were drawn from prior studies (Garnham et al., 2021; Au, 1986; Crinean & Garnham, 2006; Solstad & Bott, 2023; Rigalleau et al., 2014; Goikoetxea et al., 2008; Bott & Solstad, 2014; Van den Hoven & Ferstl, 2018; Hartshorne & Snedeker, 2013). Many of these verbs were recurrent across studies. To ensure balance, the number of verbs per category was kept equal, with each category comprising 28 verbs. Verbs frequently used in Turkish were selected to enhance naturalness.

The sentence structure followed the pattern: N1, N2, [verb in past tense], because... (e.g. Ali Ayşe'yi korkuttu, çünkü). Each verb was presented twice: once with a masculine (M) subject and a feminine (F) object, and once with a feminine subject and a masculine object. Consequently, a total of 224 sentences were created.

To prevent participant fatigue and to make sure that each participant saw a single verb in only one gender structure, 224 sentences were distributed across four lists following Latin Square design. The design ensured that each list contained a balanced set of verbs and gender structures. The sentence order was consistent within each list. The structure of the lists was as follows:

| Verb Type | Example Sentence                | Gender Order | List   | Expected IC Bias |
|-----------|---------------------------------|--------------|--------|------------------|
| SE        | Ali Ayşe'yi korkuttu, çünkü     | M-F          | List 1 | N1-M             |
| SE        | Ayşe Ali'yi korkuttu, çünkü     | F-M          | List 3 | N1-F             |
| ES        | Selim Nazlı'dan korktu, çünkü   | M-F          | List 2 | N2-F             |
| ES        | Nazlı Selim'den korktu, çünkü   | F-M          | List 4 | N2-M             |
| AP        | Furkan Melis'e vurdu, çünkü     | M-F          | List 3 | N1-M             |
| AP        | Melis Furkan'a vurdu, çünkü     | F-M          | List 1 | N1-F             |
| AE        | Ahmet Ela'yı tebrik etti, çünkü | M-F          | List 4 | N2-F             |
| AE        | Ela Ahmet'i tebrik etti, çünkü  | F-M          | List 2 | N2-M             |

**Table 1.** *Sample distribution of verbs by type and expected IC bias*

The names were selected from two sources: (1) the top 30 most commonly given names for babies born between 2018 and 2023 (URL-1) and (2) the top 30 most frequently used names during these years (URL-2), according to data from the Turkish Statistical Institute's Population Statistics Portal. All selected names consisted of two syllables and were similar in length. Gender-ambiguous names were explicitly excluded, and every effort was made to omit names that were considered old-fashioned or uncommon.

### 3.3. Procedure

The study was conducted over four separate class sessions using a pen-and-paper format. The task consisted of two phases. In the first phase, participants were asked to complete 56 sentences by intuitively filling in the blanks following the conjunction *çünkü*. They were instructed to provide spontaneous responses. Additionally, they were explicitly advised not to associate the names in the sentences with real-life individuals. They were further instructed that the responses had to be contextually relevant and logically coherent. Prior to the main task, participants completed a short practice session with four sample sentences containing verbs not included in the study. In the second phase, following Goikoetxea et al. (2008), participants revisited their completed sentences and, without modifying their responses, identified which of the two referents they considered the cause of the event. They indicated their choice by circling one of the names. This step was included to increase the number of valid responses, as some sentence completions by native speakers were ambiguous, potentially referring to either referent in the sentence. The entire procedure lasted approximately 30 minutes.

### 3.4. Coding and Analysis

A total of 8624 sentences were collected from participants. Both the written completions and circled selections were manually checked for consistency. Exclusions were made for (i) incomplete or insensible completions (0,49%), (ii) responses where causality was not clearly attributed to a single referent (regardless of whether a referent was circled) (1,02%), and (iii) cases where participants circled both referents as the cause (2,31%). After data cleaning, 8295 sentences remained for final analysis. Each response was coded as either N1 bias (subject-attributed causality) or N2 bias (object-attributed causality).

Two types of analysis were made. In the first place, the analysis examines whether the overall proportion of N1 choices, as well as participant gender, differ significantly from chance level (0.50). It also includes verb-level bias distributions, identifying individual verbs with particularly strong NP1 or NP2 orientations and highlighting exceptions to the general trends within each verb type.

The second analysis focuses understanding the relationship between different gender-combinations (both participant and referent gender) and verb type. It specifically focuses on how participant gender and referent gender influence implicit causality biases across four verb types in Turkish.

## 4. Results

Across all verbs, the mean N1 attribution rate was 47.21%. Analysis of N1 attribution rates across verb types revealed clear differences in IC patterns. Accordingly, one-sample *t*-tests were conducted to determine whether the mean N1 bias for each verb type differed

significantly from chance level (0.50). Stimulus–Experiencer (SE) verbs showed the strongest subject-oriented bias ( $Mean = 76.90\%$ ),  $t(27) = 8.71$ ,  $p < .001$ . In contrast, Experiencer–Stimulus (ES) verbs displayed a strong object-oriented tendency ( $Mean = 25.82\%$ ),  $t(27) = -6.85$ ,  $p < .001$ . Agent–Evocator (AE) verbs also showed a significant NP2 bias ( $Mean = 33.34\%$ ),  $t(27) = -3.69$ ,  $p = .001$ . In contrast, Agent–Patient (AP) verbs showed a moderate N1 bias ( $Mean = 52.71\%$ ), which did not differ significantly from chance level,  $t(27) = 0.64$ ,  $p = .528$ .

Separate one-sample t-tests were conducted for female and male participants to examine whether N1 bias for each verb type differed from chance level (0.50). For SE verbs, both male ( $Mean = 81.00\%$ ) and female participants ( $Mean = 74.36\%$ ) showed a strong and significant NP1 preference,  $t(27) = 10.95$ ,  $p < .001$ , and  $t(27) = 6.83$ ,  $p < .001$ , respectively. ES verbs elicited a significant NP2 bias for both male ( $Mean = 27.46\%$ ) and female participants ( $Mean = 24.96\%$ ),  $t(27) = -5.94$ ,  $p < .001$ , and  $t(27) = -7.12$ ,  $p < .001$ , respectively. AE verbs also showed a significant NP2 bias for both male ( $Mean = 34.43\%$ ) and female participants ( $Mean = 32.75\%$ ),  $t(27) = -3.52$ ,  $p = .002$ , and  $t(27) = -3.66$ ,  $p = .001$ , respectively. In contrast, AP verbs did not differ significantly from chance for either male ( $Mean = 54.96\%$ ) or female participants ( $Mean = 51.21\%$ ),  $t(27) = 1.17$ ,  $p = .254$ , and  $t(27) = 0.28$ ,  $p = .785$ , respectively.

Following, a comprehensive representational scale for all 112 verbs is provided in the appendix. Each verb is listed under its respective verb type and presented with its exact N1 bias proportion, total responses, and gender-specific N1 rates for male and female participants. This scale enables the identification of verbs with strong NP1 or NP2 biases, the selection of stimuli matching specific bias strengths, and direct comparison of bias patterns across verb types and participant gender groups.

An examination of verb-level biases within each category also revealed distinct distributional patterns. SE verbs were overwhelmingly NP1-oriented, with 26 out of 28 verbs showing an N1 bias greater than 0.5. The only exceptions were *cesaretlendirmek* (to encourage, 0.40) and *sakinleştirmek* (to calm, 0.23), both indicating a shift toward NP2 attribution despite belonging to a typically NP1-biased category. Several SE verbs displayed particularly strong NP1 preferences, such as *büyülemek* (to fascinate, 0.93), *kafasını karıştırmak* (to confuse, 0.93), *kızdırmak* (to anger, 0.92), *telaşlandırmak* (to fluster, 0.92). ES verbs, in contrast, predominantly favored NP2, with only five verbs—*katlanmak* (to endure, 0.73), *özlemek* (to miss, 0.60), *değer vermek* (to value, 0.58), *merak etmek* (to wonder, 0.54), and *utanmak* (to be ashamed, 0.53)—exceeding the 0.5 N1 threshold; within this group, strong NP2 biases were evident for verbs such as *takdir etmek* (to appreciate, 0.07), *nefret etmek* (to hate, 0.09), *sinirlenmek* (to get angry, 0.09), and *üzülmek* (to be sad, 0.10). AP verbs exhibited a more balanced distribution, with 15 verbs above 0.5 N1 bias—such as *çarpmak* (to hit, 0.91) and *kandırmak* (to deceive, 0.86)—and 13 verbs at or below the threshold, including *uyandırmak* (to wake, 0.08) and *tutuklamak* (to arrest, 0.12). AE verbs showed the strongest NP2 orientation, with only six verbs—e.g., *özür dilemek* (to apologize, 0.97) and *kötülemek* (to disparage, 0.74)—surpassing the N1 bias mark, while the majority clustered well below chance, with several verbs such as *ödüllendirmek* (to reward, 0.03), *teşekkür etmek* (to thank, 0.03), *tebrik etmek* (to congratulate, 0.04) showing extreme NP2 bias.

Overall, there were no widespread gender-based differences in N1 interpretation preferences of participants, but a few verbs showed notable gaps between male and female participants. The most striking example is *eğlendirmek* (to entertain, SE, 0.86 for

male vs. 0.35 for female). Other verbs with noticeable male–female differences include *rahatsız etmek* (to disturb, SE, 0.97 for male vs. 0.72 for female), *neşelendirmek* (to cheer up, SE, 0.72 for male vs. 0.51 for female), *inanmak* (to believe, ES, 0.6 for male vs. 0.43 for female), *sevmek* (to love, ES, 0.38 for male vs. 0.13 for female), *sarılmak* (to hug, AP, 0.76 for male vs. 0.55 for female), *kurtarmak* (to save, AP, 0.68 for male vs. 0.39 for female), *kaldırmak* (to lift, AP, 0.48 for male vs. 0.28 for female), *alay etmek* (to mock, AE, 0.26 for male vs. 0.50 for female) and *iltifat etmek* (to compliment, AE, 0.55 for male vs. 0.32 for female).

To examine the effect of different gender configurations on the likelihood of selecting N1 as the cause, a logistic regression model was employed. Participant gender and referent gender (N1 and N2) were included as categorical predictors. For the purposes of the analysis, these two factors were combined into a single categorical variable with four levels. The configuration F\_F\_M was designated as the reference category:

F\_F\_M: Female participant, Female N1, Male N2

F\_M\_F: Female participant, Male N1, Female N2

M\_F\_M: Male participant, Female N1, Male N2

M\_M\_F: Male participant, Male N1, Female N2

For SE verbs, descriptive results showed that the bias score in the F\_F\_M condition was 0.74, increasing slightly to 0.75 in the F\_M\_F condition. In contrast, male participant conditions displayed higher scores: 0.81 in M\_F\_M and 0.82 in M\_M\_F. The regression analysis indicated that both M\_F\_M (coefficient = 0.397,  $p = 0.010$ ) and M\_M\_F (coefficient = 0.478,  $p = 0.002$ ) were significantly more likely to attribute causality to N1 compared to the reference group. The F\_M\_F configuration, however, showed no significant difference from the reference (coefficient = 0.096,  $p = 0.453$ ). These results highlight a clear gender-related pattern, where male participants—regardless of N1 gender—were more inclined to assign causality to N1 than female participants in the reference configuration.

For ES verbs, the reference condition F\_F\_M had a bias score of 0.25. In the F\_M\_F condition, the bias score slightly decreased to 0.23. For male participants, the bias score was 0.27 in both the M\_F\_M and M\_M\_F conditions. Logistic regression analysis showed no statistically significant differences compared to the reference group: F\_M\_F (coefficient = -0.075,  $p = 0.428$ ), M\_F\_M (coefficient = 0.071,  $p = 0.496$ ), and M\_M\_F (coefficient = 0.078,  $p = 0.434$ ).

For AP verbs, the reference condition F\_F\_M had a bias score of 0.49. In the F\_M\_F condition, the score rose to 0.53, showing a slight increase in the proportion of N1 selections. Male participants showed the same bias score of 0.53 in the M\_F\_M condition, while the M\_M\_F condition yielded the highest score of 0.56. The logistic regression analysis indicated that differences between the reference group and the F\_M\_F (coefficient = 0.155,  $p = 0.181$ ) and M\_F\_M (coefficient = 0.163,  $p = 0.181$ ) conditions were not statistically significant. However, the M\_M\_F condition showed a significant effect (coefficient = 0.291,  $p = 0.026$ ), suggesting that male participants were more likely to attribute causality to N1 when both the participant and N1 were male.

For AE verbs, the reference condition F\_F\_M had a bias score of 0.30. In the F\_M\_F condition, this score increased to 0.35, while the M\_F\_M condition showed a slightly lower value of 0.34. The M\_M\_F condition again matched the F\_M\_F condition at 0.35. The logistic regression results revealed a statistically significant difference between the

reference group and the F\_M\_F condition (coefficient = 0.237,  $p = 0.045$ ), indicating a higher likelihood of selecting N1 in this configuration. The M\_F\_M (coefficient = 0.216,  $p = 0.093$ ) and M\_M\_F (coefficient = 0.229,  $p = 0.089$ ) conditions did not reach statistical significance.

## 5. Discussion

The present study represents the first systematic investigation of IC biases for interpersonal verbs in Turkish, combining verb-level normative data with an analysis of gender effects in causal attribution. Across the 112 verbs examined, clear patterns emerged that align with established cross-linguistic findings (Garvey & Caramazza, 1974; Brown & Fish, 1983; Goikoetxea et al., 2008; Hartshorne & Snedeker, 2013). SE verbs showed a robust NP1 bias, and ES verbs displayed a consistent NP2 bias. AE verbs demonstrated a pronounced NP2 orientation, while AP verbs exhibited a near-chance distribution, representing earlier reports of variability and weaker IC patterns for action verbs (Rudolph & Försterling, 1997; Bott & Solstad, 2014).

At the individual verb level, most verbs conformed to the dominant bias of their category, but several notable exceptions were identified, highlighting that verb-specific tendencies do not always align perfectly with category-level patterns. Therefore, the establishment of a representational scale for each verb provides a methodological resource for future Turkish IC research, ensuring comparability across studies and enabling precise stimulus selection.

In terms of gender effects, overall IC biases were broadly consistent across male and female participants; however, certain verbs showed substantial male–female differences in N1 attribution rates, indicating that gender may interact with verb semantics for specific lexical items.

Considering the interaction between participant gender and referent gender, for SE verbs, male participants—regardless of N1 gender—were significantly more likely than the female reference group to attribute causality to N1. For AP verbs, a significant effect emerged only when both participant and N1 were male (M\_M\_F), while for AE verbs, female participant group with a male N1 (F\_M\_F) showed a higher N1 bias than the female reference group. For ES verbs, no significant gender configuration effects were observed. These findings suggest that while overall IC patterns remain stable across genders, certain social and referential configurations can subtly modulate causal attribution in Turkish.

Regarding verb types, the findings indicate that causal attribution is generally stronger for psych verbs than for action verbs. This pattern suggests that the IC biases of SE and ES verbs are primarily determined by verb semantics and argument structure (Brown & Fish, 1983; Crinean & Garnham, 2006). In SE verbs, the Stimulus is inherently causal, prompting participants to attribute causality to NP1, whereas in ES verbs, the Experiencer occupies a causally passive role, leading to Stimulus which is in the NP2 position causal attribution. These results are consistent with theories positing that certain thematic roles—particularly Stimulus—are intrinsically linked to causality attribution, regardless of syntactic position. The stability of these patterns across genders, with only minor differences in bias scores, further reinforces a lexical–semantic account of IC bias.

However, it is important to recognize that not all verbs are equally representative of their assigned category. For instance, although prior studies classify *sakinleştirmek* (to calm) as an SE verb, its bias score in the present study was only 0.23, which is inconsistent with the strong NP1 orientation typically associated with SE verbs. The

reason for this deviation is not entirely clear, but possible explanations include the verb's valence (positive vs. negative connotation), specific lexical meaning, or culturally mediated social hierarchy effects. Accordingly, one can argue that some verbs display prototypical IC patterns and serve as strong representatives of their category and some do not. An interesting cross-linguistic parallel emerges when comparing *sakinleştirmek* to findings from Goikoetxea et al.'s (2008) study, where its bias score was only 0.04. This convergence suggests that certain verbs' weaker representativeness may be a cross-linguistic phenomenon, requiring further investigation into the factors that underlie such deviations.

By contrast, AP verbs showed weaker and more variable IC patterns. AP verbs, which encode clear agent–patient structures, nonetheless failed to elicit a strong and consistent NP1 preference. This aligns with Bott and Solstad's (2014) argument that action verbs may already encode causality in their semantics, reducing the need for additional causal inference. On the other hand, the findings showed that AE verbs displayed a strong NP2 orientation, consistent with the idea that the Evocator role attracts causality in discourse explanation (Solstad & Bott, 2022). However, this varied across individual verbs, as some verbs belonging to the category of AE did not display strong N2 orientation, suggesting that some other factors such as the lexical meaning and verb's emotional valence may modulate IC patterns for these categories.

Overall, following prior studies (e.g., Brown & Fish, 1983; Goikoetxea et al., 2008), the present findings suggest that implicit causality is strongly shaped by certain thematic roles and verb semantics. In line with theoretical accounts, SE verbs systematically assigned causality to N1, where the Stimulus in subject position is perceived as the initiator of the event. This tendency was particularly strong in verbs such as *büyülemek* (to fascinate, 0.93), *kafasını karıştırmak* (to confuse, 0.93), and *kızdırmak* (to anger, 0.92). Similarly, ES verbs consistently attributed causality to N2, where the Experiencer is positioned as causally passive and the Stimulus in object position is seen as the cause. Strong NP2 biases were evident in verbs such as *takdir etmek* (to appreciate, 0.07), *sinirlenmek* (to get angry, 0.09), and *nefret etmek* (to hate, 0.09).

By contrast, AP verbs showed more variability, reflecting that the Agent role does not consistently determine causality in either N1 or N2. While some AP verbs displayed strong NP1 biases—such as *çarpmak* (to hit, 0.91) and *kandırmak* (to deceive, 0.86)—others leaned toward NP2, such as *uyandırmak* (to wake, 0.08) and *tutuklamak* (to arrest, 0.12). AE verbs, although not as strongly biased as psych verbs, tended to assign causality to the Evocator, often in NP2 position. This was most pronounced in verbs such as *ödüllendirmek* (to reward, 0.03), *teşekkür etmek* (to thank, 0.03), and *tebrik etmek* (to congratulate, 0.04). Although most verbs conformed to the dominant bias of their category, with AP verbs showing the most internal variability. Notable exceptions across all categories highlight that verb-specific tendencies do not always align perfectly with category-level patterns. This variability resonates with broader debates in the IC literature. Prior research has consistently shown that IC is neither categorical nor uniform but rather probabilistic and gradient in nature (Garvey & Caramazza, 1974; Brown & Fish, 1983). While some accounts attribute IC solely to thematic role structure (Crinean & Garnham, 2006), other studies emphasize its graded character, arguing that causal attribution patterns emerge probabilistically rather than as fixed categorical rules (Rudolph & Försterling, 1997). The present findings align with this latter perspective by

demonstrating that certain verbs in Turkish do not reliably conform to a stable representational bias but instead display verb-specific tendencies that reflect the inherently probabilistic nature of IC. These deviations further suggest that IC bias constitutes a complex phenomenon, likely modulated by additional factors such as emotional valence, lexical meaning, or sociocultural associations.

The study also revealed that the interaction among different gender configurations had a modest influence on IC bias, and its effects were largely selective. For verbs that assign causality to N1, male participants were generally more likely than female participants to attribute causality to N1. In SE verbs, this tendency was consistent across referent gender—male participants, whether encountering a male or female N1, demonstrated significantly stronger NP1 attribution compared to female participants in the reference configuration. For AP verbs, a significant increase in NP1 bias emerged only when both the participant and N1 were male, indicating that male participants were especially prone to attributing causality to male N1 referents in this verb category.

In contrast, verbs that predominantly assign causality to N2 were less affected by gender configuration. ES verbs were entirely unaffected by gender combinations, while AE verbs showed a small but statistically significant increase in NP1 selections when female participants encountered male N1 referents. This suggests that, in this category, female participants were more inclined to assign causality to male N1s, even though the default bias typically favors NP2.

A plausible explanation for these patterns lies in the interaction between linguistic bias and socially learned gender schemas. Prior research has shown that men are often stereotypically perceived as more agentive and causally responsible in interpersonal contexts, whereas women are more frequently viewed as recipients or responders (LaFrance et al., 1997). For male participants, this may lead to attribute causality to N1 when the verb already favors N1 causation. Similarly, the particularly strong effect when both participant and N1 are male in AP verbs may stem from salience of male agency when both the self and the referent share gender identity.

For female participants, the only observed gender-based modulation occurred in AE verbs with male N1s. Given that AE verbs often involve evaluative acts (e.g., congratulating, thanking), women may be more inclined to perceive male actors in these roles as initiating the action—possibly reflecting cultural scripts that associate male behavior with overt social acts of recognition or authority. This aligns with findings that gender norms can subtly influence the interpretation of social actions (Ferstl et al., 2011).

An additional observation concerns the verbs that were frequently realized as actions jointly performed by two individuals. Although exploring the underlying reasons for this tendency lies beyond the scope of the present study, it remains a noteworthy finding. For certain verbs, implicit causality may not be restricted to a single referent but can instead extend to both participants in the event structure. In such cases, causal attribution appears to be distributed across the two entities rather than being localized in one argument position. Examples of verbs that displayed this pattern include *elini sıkmak* (to shake hands), *kovalamak* (to chase), *özlemek* (to miss), and *çağırarak* (to call). This observation suggests that some verbs inherently encode reciprocity or relational dynamics, thereby complicating the assignment of a unidirectional IC bias and raising new questions for future research.

Taken together, the present findings suggest that IC in Turkish is shaped primarily by verb semantics and thematic role structure, but is also modulated in selective ways by

gender-related social knowledge. Rather than being categorical, IC emerges as a probabilistic and gradient phenomenon, where linguistic constraints may interact with socially learned schemas to shape attribution patterns. This influence necessitates the need for multifactorial models of IC that integrate semantic, pragmatic, and sociocultural dimensions. Methodologically, the establishment of verb-level representational scales provides a valuable foundation for future Turkish IC research, ensuring comparability across studies and enabling precise stimulus selection. Future investigations should expand this approach by incorporating psycholinguistic measures such as eye-tracking to capture the online processing of IC, as well as exploring the role of emotional valence, lexical meaning, and broader cultural scripts in shaping attribution.

### **Conclusion**

This study offers the first normative dataset of IC biases for Turkish interpersonal verbs, confirming robust SE, ES, and AE patterns, identifying variable AP patterns, and demonstrating that gender configuration exerts only selective effects. These findings contribute to both cross-linguistic IC research and theoretical debates on the origins of IC bias, supporting a model in which verb semantics and thematic role structure form the core of IC effects, with contextual and social factors acting as modulators. Importantly, the results reinforce the view that IC is not categorical but probabilistic in nature, manifesting as graded tendencies rather than fixed rules of causal attribution. The normative scale provided here thus offers a foundational tool for future psycholinguistic, cognitive, and discourse studies in Turkish, enabling more controlled and replicable investigations of causal attribution.

While the present study provides the first large-scale IC norms for Turkish, several limitations warrant consideration. First, all stimuli were presented in isolated sentence contexts, without extended discourse. Given evidence that discourse structure and connectives can influence IC bias (Stevenson et al., 1994; Kehler et al., 2008), future studies should test whether these Turkish IC patterns hold in more naturalistic settings. Second, while gender effects may interact with other social variables such as status, familiarity, or emotional valence, these dimensions were not systematically manipulated in the current design. Taken together, future research integrating discourse-level manipulations, social-contextual variables, and experimental methods could further clarify how probabilistic IC biases emerge and interact with broader mechanisms of language processing and social cognition.

### **Abbreviations**

|     |                      |
|-----|----------------------|
| AE: | Agent-Evocator       |
| AP: | Agent-Patient        |
| ES: | Experiencer-Stimulus |
| F:  | Feminine             |
| IC: | Implicit Causality   |
| M:  | Masculine            |
| SE: | Stimulus-Experiencer |

### **Data Availability Statement**

The data supporting the findings of this study are available from the corresponding author upon reasonable request.

## References

- Anting Tan, F., Hürriyetoglu, A., Caselli, T., Oostdijk, N., Nomoto, T., Hettiarachchi, H., Ameer, I., Uca, O., Ferdousi Liza, F., & Hu, T. (2022). The causal news corpus: Annotating causal relations in event sentences from news. *In Proceedings of the Thirteenth Language Resources and Evaluation Conference: LREC 2022* (pp. 2298-2310). European Language Resources Association (ELRA).
- Au, T. K. (1986). A verb is worth a thousand words: The causes and consequences of interpersonal events implicit in language. *Journal of Memory & Language*, 25, 104-122.
- Bott, O., & Solstad, T. (2014). From verbs to discourse: A novel account of implicit causality. In *Psycholinguistic approaches to meaning and understanding across languages* (pp. 213-251). Cham: Springer International Publishing.
- Bott, O., & Solstad, T. (2021). Discourse expectations: explaining the implicit causality biases of verbs. *Linguistics*, 59(2), 361-416.
- Brown, R., & Fish, D. (1983). The psychological causality implicit in language. *Cognition*, 14, 237-273.
- Caramazza, A., Grober, E., Garvey, C., & Yates, J. (1977). Comprehension of anaphoric pronouns. *Journal of Verbal Learning & Verbal Behavior*, 16, 601-609.
- Corrigan, R. (2001). Implicit causality in language: Event participants and their interactions. *Journal of Language & Social Psychology*, 20, 285-320.
- Corrigan, R., & Stevenson, C. (1994). Children's causal attributions to states and events described by different classes of verbs. *Cognitive Development*, 9, 235-256.
- Crinean, M., & Garnham, A. (2006). Implicit causality, implicit consequentiality and semantic roles. *Language and Cognitive Processes*, 21(5), 636-648.
- Ferstl, E. C., Garnham, A., & Manouilidou, C. (2011). Implicit causality bias in English: A corpus of 300 verbs. *Behavior Research Methods*, 43(1), 124-135.
- Garnham, A., & Oakhill, J. (1985). On-line resolution of anaphoric pronouns: effects of inference making and verb semantics. *British Journal of Psychology*, 76(3), 385-393.
- Garnham, A., Oakhill, J., & Cruttenden, H. (1992). The role of implicit causality and gender cue in the interpretation of pronouns. *Language and Cognitive Processes*, 7(3-4), 231-255.
- Garnham, A., Vorthmann, S., & Kaplanova, K. (2021). Implicit consequentiality bias in English: A corpus of 300+ verbs. *Behavior Research Methods*, 53(4), 1530-1550.
- Garrod, S., & Terras, M. (2000). The contribution of lexical and situational knowledge to resolving discourse roles: Bonding and resolution. *Journal of Memory and Language*, 42(4), 526-544.
- Garvey, C., & Caramazza, A. (1974). Implicit causality in verbs. *Linguistic Inquiry*, 5(3), 459-464.
- Goikoetxea, E., Pascual, G., & Acha, J. (2008). Normative study of the implicit causality of 100 interpersonal verbs in Spanish. *Behavior Research Methods*, 40(3), 760-772.

- Hartshorne, J. K. (2014). What is implicit causality?. *Language, Cognition and Neuroscience*, 29(7), 804-824.
- Hartshorne, J. K., & Snedeker, J. (2013). Verb argument structure predicts implicit causality: The advantages of finer-grained semantics. *Language and Cognitive Processes*, 28(10), 1474-1508.
- Kehler, A., (2002). *Coherence, reference, and the theory of grammar* (Vol. 380). Stanford, CA: CSLI Publications.
- Kehler, A., Kertz, L., Rohde, H., & Elman, J. L. (2008). Coherence and coreference revisited. *Journal of Semantics*, 25(1), 1-44.
- LaFrance, M., Brownell, H., & Hahn, E. (1997). Interpersonal verbs, gender, and implicit causality. *Social Psychology Quarterly*, (60), 138-152.
- Levin, B., & Rappaport Hovav, M. (2005). *Argument realization*. Cambridge: Cambridge University Press.
- Long, D. L., & De Ley, L. (2000). Implicit causality and discourse focus: The interaction of text and reader characteristics in pronoun resolution. *Journal of Memory and Language*, 42(4), 545-570.
- Mannetti, L., & De Grada, E. (1991). Interpersonal verbs: Implicit causality of action verbs and contextual factors. *European Journal of Social Psychology*, 21(5), 429-443.
- McKoon, G., Greene, S. B., & Ratcliff, R. (1993). Discourse models, pronoun resolution, and the implicit causality of verbs. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 19(5), 1040.
- McKoon, G., & Ratcliff, R. (1989). Semantic associations and elaborative inference. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 15(2), 326-338.
- Pickering, M. J., & Majid, A. (2007). What are implicit causality and consequentiality?. *Language and Cognitive Processes*, 22(5), 780-788.
- Rigalleau, F., Guerry, M., & Granjon, L. (2014). The effect of connectives on the selection of arguments: Implicit consequentiality bias for the connective “but”. *Journal of Psycholinguistic Research*, 43(4), 465-485.
- Rudolph, U., & Försterling, F. (1997). The psychological causality implicit in verbs: A review. *Psychological Bulletin*, 121(2), 192-218.
- Semin, G. R., & Fiedler, K. (1988). The cognitive functions of linguistic categories in describing persons: Social cognition and language. *Journal of Personality and Social Psychology*, 54(4), 558-568.
- Solstad, T., & Bott, O. (2022). On the nature of implicit causality and consequentiality: the case of psychological verbs. *Language, Cognition and Neuroscience*, 37(10), 1311-1340.
- Solstad, T., & Bott, O. (2023). Implicit causality and consequentiality of action verbs. *Frontiers in Language Sciences*, 2, 1143214.

- Stevenson, R. J., Crawley, R. A., & Kleinman, D. (1994). Thematic roles, focus and the representation of events. *Language and Cognitive Processes*, 9(4), 519-548.
- Stewart, A. J., Pickering, M. J., & Sanford, A. J. (1998). Implicit consequentiality. In *Proceedings of the Twentieth Annual Conference of the Cognitive Science Society* (pp.1031–1036). Mahwah, NJ: Lawrence Erlbaum Associates, Inc.
- Trabasso, T., & Van Den Broek, P. (1985). Causal thinking and the representation of narrative events. *Journal of Memory and Language*, 24(5), 612-630.
- Van den Hoven, E., & Ferstl, E. C. (2018). Discourse context modulates the effect of implicit causality on rementions. *Language and Cognition*, 10(4), 561-594.
- Zheng, M., Marsh, J. K., Nickerson, J. V., & Kleinberg, S. (2020). How causal information affects decisions. *Cognitive Research: Principles and Implications*, 5, 1-24.

### Online Sources

- (URL-1): Turkish Statistical Institute. (n.d.-a). *Yeni doğan isimleri*. Retrieved January 25, 2025, from <https://nip.tuik.gov.tr/?value=YeniDoganIsimleri>
- (URL-2): Turkish Statistical Institute. (n.d.-b). *En çok kullanılan isimler*. Retrieved January 20, 2025, from <https://nip.tuik.gov.tr/?value=EnCokKullanilanIsimler>

## Appendix

Normative Bias Scores for Turkish Interpersonal Verbs<sup>1</sup>*NI responses*

| Stimulus-Experiencer Verbs                 | Overall | Male  | Female |
|--------------------------------------------|---------|-------|--------|
| büyülemek (to fascinate)                   | 0.93    | 0.89  | 0.96   |
| kafasını karıştırmak (to confuse)          | 0.93    | 0.93  | 0.93   |
| kızdırmak (to anger)                       | 0.92    | 0.89  | 0.94   |
| telaşlandırmak (to fluster)                | 0.92    | 0.85  | 0.96   |
| çileden çıkartmak (to infuriate)           | 0.89    | 0.89  | 0.89   |
| duygulandırmak (to move emotionally)       | 0.89    | 0.89  | 0.89   |
| sinirlendirmek (to irritate)               | 0.87    | 0.9   | 0.85   |
| heyecanlandırmak (to excite)               | 0.86    | 0.85  | 0.87   |
| canını sıkmak (to annoy)                   | 0.85    | 0.93  | 0.81   |
| endişelendirmek (to worry)                 | 0.85    | 0.93  | 0.81   |
| hayal kırıklığına uğratmak (to disappoint) | 0.85    | 0.86  | 0.85   |
| utandırmak (to embarrass)                  | 0.85    | 0.84  | 0.85   |
| öfkелendirmek (to enrage)                  | 0.83    | 0.87  | 0.8    |
| rahatsız etmek (to disturb)                | 0.82    | 0.97  | 0.73   |
| üzmek (to sadden)                          | 0.82    | 0.87  | 0.79   |
| cesaretini kırmak (to discourage)          | 0.82    | 0.93  | 0.76   |
| sevindirmek (to make happy)                | 0.82    | 0.93  | 0.74   |
| şaşkına çevirmek (to stupefy)              | 0.79    | 0.73  | 0.83   |
| korkutmak (to scare)                       | 0.75    | 0.71  | 0.77   |
| ürkütmek (to frighten)                     | 0.73    | 0.8   | 0.68   |
| hayrete düşürmek (to amaze)                | 0.72    | 0.71  | 0.73   |
| küçük düşürmek (to humiliate)              | 0.72    | 0.77  | 0.69   |
| şaşırtmak (to surprise)                    | 0.69    | 0.72  | 0.67   |
| ilham vermek (to inspire)                  | 0.63    | 0.71  | 0.58   |
| neşelendirmek (to cheer up)                | 0.59    | 0.72  | 0.51   |
| eğlendirmek (to entertain)                 | 0.56    | 0.86  | 0.35*  |
| cesaretlendirmek (to encourage)            | 0.4*    | 0.43* | 0.39*  |
| sakinleştirmek (to calm)                   | 0.23*   | 0.3*  | 0.19*  |

*NI responses*

| Experiencer-Stimulus Verbs | Overall | Male  | Female |
|----------------------------|---------|-------|--------|
| katlanmak (to endure)      | 0.73*   | 0.67* | 0.77*  |
| özlemek (to miss)          | 0.6*    | 0.57* | 0.62*  |
| değer vermek (to value)    | 0.58*   | 0.6*  | 0.57*  |

<sup>1</sup> The appendix presents the IC bias scores for all verbs included in the study. To highlight deviations from the expected category-level bias, verbs that do not conform to the tendency are marked with an asterisk (\*). Specifically:

For SE and AP verbs, bias scores below 0.50 are marked with an asterisk.

For ES and AE verbs, bias scores above 0.50 are marked with an asterisk.

## A TAXONOMY OF IMPLICIT CAUSALITY IN 112 TURKISH INTERPERSONAL VERBS

|                                  |       |       |      |
|----------------------------------|-------|-------|------|
| merak etmek (to wonder)          | 0.54* | 0.61* | 0.5* |
| utanmak (to be ashamed)          | 0.53* | 0.61* | 0.49 |
| inanmak (to believe)             | 0.5   | 0.6*  | 0.43 |
| şüphelenmek (to suspect)         | 0.32  | 0.36  | 0.3  |
| kıskanmak (to envy)              | 0.29  | 0.33  | 0.27 |
| saygı duymak (to respect)        | 0.28  | 0.25  | 0.3  |
| şaşırmak (to be surprised)       | 0.28  | 0.32  | 0.26 |
| aşık olmak (to fall in love)     | 0.23  | 0.31  | 0.18 |
| ilham almak (to be inspired)     | 0.22  | 0.16  | 0.26 |
| sevmek (to love)                 | 0.22  | 0.38  | 0.13 |
| korkmak (to fear)                | 0.21  | 0.27  | 0.17 |
| endişelenmek (to worry)          | 0.19  | 0.21  | 0.19 |
| küsmek (to be offended)          | 0.16  | 0.11  | 0.19 |
| hoşlanmak (to like)              | 0.14  | 0.13  | 0.15 |
| kırılmak (to feel hurt)          | 0.14  | 0.16  | 0.12 |
| rahatsız olmak (to be disturbed) | 0.14  | 0.14  | 0.13 |
| beğenmek (to like)               | 0.13  | 0.13  | 0.13 |
| acımak (to pity)                 | 0.12  | 0.07  | 0.15 |
| etkilenmek (to be impressed)     | 0.11  | 0.13  | 0.1  |
| hayran kalmak (to admire)        | 0.11  | 0.06  | 0.15 |
| öfkelenmek (to get angry)        | 0.11  | 0.15  | 0.09 |
| üzülmek (to be sad)              | 0.1   | 0.15  | 0.06 |
| nefret etmek (to hate)           | 0.09  | 0.07  | 0.11 |
| sinirlenmek (to get angry)       | 0.09  | 0.07  | 0.11 |
| takdir etmek (to appreciate)     | 0.07  | 0.07  | 0.06 |

*N1 responses*

| Agent-Patient Verbs           | Overall | Male  | Female |
|-------------------------------|---------|-------|--------|
| çarpmak (to hit)              | 0.91    | 1     | 0.85   |
| kandırmak (to deceive)        | 0.86    | 0.81  | 0.89   |
| çağırmak (to call over)       | 0.85    | 0.79  | 0.9    |
| aramak (to call)              | 0.81    | 0.79  | 0.83   |
| elini sıkmak (to shake hands) | 0.81    | 0.86  | 0.73   |
| öpmek (to kiss)               | 0.79    | 0.81  | 0.78   |
| yaralamak (to injure)         | 0.72    | 0.72  | 0.72   |
| yenmek (to defeat)            | 0.68    | 0.65  | 0.7    |
| dışlamak (to exclude)         | 0.62    | 0.63  | 0.62   |
| sarılmak (to hug)             | 0.62    | 0.76  | 0.55   |
| kötü davranmak (to mistreat)  | 0.59    | 0.61  | 0.57   |
| saldırmak (to attack)         | 0.57    | 0.5   | 0.61   |
| itmek (to push)               | 0.56    | 0.61  | 0.52   |
| vurmak (to hit)               | 0.52    | 0.55  | 0.5    |
| sorgulamak (to interrogate)   | 0.51    | 0.5   | 0.51   |
| kurtarmak (to save)           | 0.5     | 0.68  | 0.39*  |
| savunmak (to defend)          | 0.5     | 0.57  | 0.46*  |
| terk etmek (to abandon)       | 0.44*   | 0.44* | 0.43*  |
| yardım etmek (to help)        | 0.42*   | 0.41* | 0.43*  |
| seçmek (to choose)            | 0.41*   | 0.3*  | 0.49*  |
| kaldırmak (to lift)           | 0.36*   | 0.48* | 0.28*  |
| tokatlamak (to slap)          | 0.32*   | 0.33* | 0.32*  |
| kovmak (to expel)             | 0.32*   | 0.29* | 0.34*  |
| ziyaret etmek (to visit)      | 0.31*   | 0.37* | 0.28*  |

## OKTAY ÇINAR

|                               |       |       |       |
|-------------------------------|-------|-------|-------|
| serbest bırakmak (to release) | 0.31* | 0.3*  | 0.31* |
| kovalamak (to chase)          | 0.25* | 0.38* | 0.16* |
| tutuklamak (to arrest)        | 0.12* | 0.16* | 0.09* |
| uyandırmak (to wake)          | 0.08* | 0.09* | 0.08* |

*N1 responses*

| Agent-Evocator Verbs                    | Overall | Male  | Female |
|-----------------------------------------|---------|-------|--------|
| özür dilemek (to apologize)             | 0.97*   | 0.96* | 0.98*  |
| kötülemek (to disparage)                | 0.74*   | 0.75* | 0.74*  |
| hor görmek (to despise)                 | 0.66*   | 0.66* | 0.67*  |
| küçümsemek (to belittle)                | 0.59*   | 0.64* | 0.57*  |
| aşağılamak (to humiliate)               | 0.58*   | 0.52* | 0.63*  |
| dalga geçmek (to mock)                  | 0.51*   | 0.42  | 0.56*  |
| terslemek (to snap at)                  | 0.5     | 0.5   | 0.5    |
| suçlamak (to accuse)                    | 0.47    | 0.46  | 0.47   |
| affetmek (to forgive)                   | 0.45    | 0.5   | 0.41   |
| eleştirmek (to criticize)               | 0.43    | 0.42  | 0.43   |
| iltifat etmek (to compliment)           | 0.41    | 0.55* | 0.32   |
| alay etmek (to mock)                    | 0.41    | 0.26  | 0.5    |
| hesap sormak (to demand an explanation) | 0.36    | 0.38  | 0.35   |
| dava açmak (to sue)                     | 0.3     | 0.34  | 0.27   |
| intikam almak (to take revenge)         | 0.29    | 0.37  | 0.24   |
| ihbar etmek (to report)                 | 0.26    | 0.28  | 0.25   |
| sitem etmek (to reproach)               | 0.23    | 0.21  | 0.24   |
| alkışlamak (to applaud)                 | 0.19    | 0.2   | 0.19   |
| cezalandırmak (to punish)               | 0.18    | 0.23  | 0.15   |
| övmek (to praise)                       | 0.17    | 0.21  | 0.15   |
| gülmek (to laugh)                       | 0.14    | 0.19  | 0.1    |
| kınamak (to condemn)                    | 0.13    | 0.14  | 0.13   |
| uyarmak (to warn)                       | 0.13    | 0.07  | 0.16   |
| azarlamak (to scold)                    | 0.1     | 0.17  | 0.06   |
| kutlamak (to celebrate)                 | 0.05    | 0.07  | 0.04   |
| tebrik etmek (to congratulate)          | 0.04    | 0.07  | 0.02   |
| teşekkür etmek (to thank)               | 0.03    | 0.07  | 0      |
| ödüllendirmek (to reward)               | 0.03    | 0     | 0.04   |