Social Attitudes Manifested in Embodying Cars in Arabic From a Cognitive Linguistics Perspective

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Abstract—This study investigates the phenomenon of "car embodiment", where humans and machines are conceptualized as a hybrid creature in everyday language. Drawing on Langacker's (2008) theory of cognitive linguistics, the author analyzed natural examples of car embodiment metaphors posted online by Modern Standard Arabic (MSA) users. Findings of the current study revealed that actions and states (46%) were more frequently embodied than body parts (16%) in these metaphors. This suggests that the conceptual blending of humans and machines is primarily driven by shared functional and experiential features rather than physical similarities. This study contributes to the understanding of conceptual embodiment in the context of human-machine interaction and highlights the potential of online data for exploring linguistic creativity.

Index Terms—car embodiment, Conceptual Metaphor Theory, Arabic metaphors, cognitive linguistics, Arabic language communication

I. INTRODUCTION

A trend in human language is the use of referring expressions concerning surrounding entities as sources of reference to things that lack established expressions. The target entities can be abstract concepts such as love and time, imaginary objects and creatures, or newly produced inventions for which referring expressions have not yet been introduced in the language, indicating that they are not as clearly delineated. Moreover, source domains are experienced more than the target domains, and human and animal bodies and related concepts are the most attractive source domains for referring expressions due to their high level of familiarity. One interesting example of such a reference relationship is when car parts are given human-referring expressions.

Because conceptual metaphors are realized by mapping source and target domains, a different choice of domain placement of human-associated objects and entities produces a distinct sort of embodiment. Consider the following embodiment types and related examples:

1. Human parts, states, and actions as the target domain[1] and the objects or entities not associated with the human being as the source domains.
   Example: "*We're still trying to grind out the solution to this equation*" (Lakoff & Johnson, 2003, p. 27).
2. Human parts, states, and actions as the source domain and the objects or entities not associated with human beings as the target domains. This is the sense of embodiment focused on in this paper.
   Example: *"Earth breathing easier as we hold our breath amid COVID-19"*
   https://dailygazette.com/article/2020/03/29/greenpoint-earth-breathing-easier-as-we-hold-our-breath
   (Accessed: 13/4/2020).

Names of human body parts can be helpful tools when referring to objects that are less delineated or familiar. Take, for instance, the "hand" of a clock, a table "leg", and a "head" of grain, all of which were, at least at the time of their invention and/or coinage of their referring expression, less delineated than the human body-part names now used to refer to them. This conceptual mapping is not perfect. This is to say that not all the features of the source parts are projected onto the target parts (Fauconnier & Turner, 2002; Langacker, 2008). For example, the time indicators on a clock dial, the sticks supporting a table's surface, and the topmost part of the wheat stalk were not expected to be perfect matches to the human hand, leg, and head, respectively, but that is what is expected from figurative mapping. Regardless of this imperfection, the human mind uses this conceptual mapping to label the target entities. Two things make the referring expressions of what were not originally perfect matches to the new objects feasible for use as their new referring expressions. One of these is the high familiarity of the source domain concept, human body parts in this case, which are inherently observable and utilized throughout daily life, both on oneself and on others encountered. (Lakoff & Johnson, 1999). The second is the peculiarity, in Lakoff and Johnson's (1999) words, of the human anatomy, whose uniqueness means it cannot be confused with other objects in the world (Lakoff & Johnson, 1999).

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[1] The source/target domain distinction locates the object or entity being metaphorically referred to in the target position and the object or entity being literally referred to in the expression in the source position.

This study considered action and state verbs and body part nouns in Modern Standard Arabic (MSA), in which human body-based metaphors were retrieved to answer the following questions:

- What are the patterns of using embodiment metaphors associated with cars in MSA?
- What are some potential reasons for using car-related embodiment metaphors in MSA?
- How are embodiment action and state words compared to human-part names when all are used as source domains for car embodiment?

II. Literature Review

For the last three decades, reasoning and cognitive processes have been claimed to be shaped by the human body's peculiarities and experiences (Lakoff & Johnson, 1999; Langacker, 2008). Connecting reason with the human body, embodiment is crucial in improving the efficiency of human communication (Varela et al., 1993; Lakoff & Johnson, 1999; Gibbs, 2005; Langacker, 2008). This improvement in communication efficiency is activated by utilizing source and target domains and blending features from these domains to create a hybrid entity (Fauconnier & Turner, 1998; Oakley & Coulson, 1999). This original hybrid entity is made and introduced in the language and retains only a few features of the original source and target entities (Langacker, 2008; Kövecses, 2010). Such conceptual integration of concepts has been exemplified in literature by the land-yacht invention. This integration combines the concepts of being operated on land and being as luxurious as a yacht in one vehicle, representing an integrated concept (Turner & Fauconnier, 1995). Other examples of hybrid entities are found in the metaphors "His idea was half-baked" and "I'm tired of warmed-over theories", where features of IDEA[2] are blended with those of food, constituting the conceptual metaphor IDEAS ARE FOOD. In this conceptual metaphor, the idea-food entity had needed some time to be ready to use; however, the type of consumption was not orally digested but mentally processed.

The association between these original and new referents provides logical reasons for the mapping. In addition, the peculiarity of the human body, in Lakoff and Johnson's (1999) terms, makes such referring expressions feasible to use as feeding the source domains. The widespread use of metaphor is associated with the readiness to use the anatomy of human-body-related concepts. Kövecses (2010) went a step further to express that since our bodies play a role in mental representation, different bodies will represent different abstract concepts. This is found clearly in the current study, as different human and animal parts, actions, and states metaphorically represent different car parts, actions, and states.

Considering the prototype notion, words interact with contexts to refer to entities and objects that the dictionary entry lacks. This is to say that the background information the word underlies extends the range of references to which this word can refer (Fillmore, 2006). This implies having two levels of prototype structure: the lexical, which is found in dictionaries, and the semantic, which is associated with seemingly disparate senses driven by contexts (Brugman & Lakoff, 2006; Geeraerts, 2016). Adopting Fillmore's (2006) example, the social practice of the concept of breakfast indicates that it has three characters, namely "post-sleep", "early morning", and "breakfast menu". However, these characters of the concept are not criterial since one can have breakfast without sleeping before it, say, in the afternoon, for example, or have foods that are not typically on the breakfast menu, respectively. Not including this information about breakfast in dictionaries does not imply a lack of understanding of the core meaning of the word, but it indicates that the word offers a category that can be used in several contexts (Fillmore, 2006). The prototype notion was found to be at play repeatedly when dealing with car parts, actions, and states in the current study.

Defining embodiment can be tricky, as it is associated with different senses. For example, cognitive concepts can be affected either by the human anatomy or by sensation (Lakoff & Johnson, 1999; Maalej, 2004; Rohrer, 2007; and others). Other points of confusion regarding the concept of embodiment include the evolutionary change of organisms, robotics, neurophysiological sense, and neurocomputational models (cf. Rohrer, 2007), which are beyond the scope of this paper. Henceforth, embodiment indicates the use of a human body part or sensation as the source domain of the metaphor used in the community of practice. More particularly, this current study examines car parts, actions, and states that have some metaphorical association with human parts, actions, and states to shed light on some of the reasons for using such terms in their new contexts. The metaphors used in this study fall under the conceptual metaphor category of MACHINES ARE PEOPLE[3] (Lakoff & Turner, 1989). Moreover, cars, as entities, have also been found to be social bodies (Young, 2001) and extensions of human bodies (Katz, 2000), and the driven car, together with the driver, constitutes a holistic assemblage (Dant, 2005).

Cognitive concepts can be shaped by the culture and society that bodies are situated in (Hutchins, 1995; Hutchins, 2005; Fauconnier & Turner, 2002; Rohrer, 2007). Živković (2014) found that the "Fića" (the nickname of the Yugoslavian-made Zastava 750 car model) represents many human attributes such as hero, family member, racer, etc. The author argues that the disjointed and mixed metaphors of this car are a reflection of Serbian life during the time of the car's production. This car model was produced locally in what was formerly called Yugoslavia and is now known as Serbia, and implies inner circle membership, excluding outer circle car models. This influence of culture cannot be seen

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[2] Capitalization of all letters indicates a reference to a concept throughout this paper.
[3] Some of the examples considered in this paper fall under the conceptual metaphor MACHINES ARE ANIMALS, which works similarly to the metaphor MACHINES ARE PEOPLE.

in Saudi Arabia. This can be a result of cars not currently being produced locally. Nonetheless, embodiment can also influence melting social barriers (Kövecses, 2004).

During times when cars were not accessible to everyone, they were considered symbols of power, inequality, and corruption. However, the mapping of corruption has changed over time; nowadays, it is more often mapped onto the abuse of cars (Notar, 2014). The author indicates that the use of a source domain can be manipulated to fit the current situation, which is why the metaphor USING A CAR IS BEING CORRUPTED is used for a different purpose, though it remains in use over time.

In previous studies, cars were embodied as both source and target domains. Those metaphors were utilized to indicate intimacy and heroism, for example, when cars are target domains (Živković, 2014). On the other hand, these metaphors were used as highlights of human traits, for example, being powerful and corrupt (Notar, 2014). To the best of the researcher's knowledge, no previous studies considered the technical and feasible use of car embodiment metaphors.

III. METHODOLOGY

As a ready-to-use list of embodiment verbs was not found, a list was synthesized using the sources in Table 1.

TABLE 1
SOURCES USED TO SYNTHESIZE EMBODIMENT VERB LIST

Source	Purpose
The Muajam Alafaal Alarabia 'Arabic Dictionary of Verbs' Aldahdah (1995)	Primary source for the embodiment verbs in Arabic
The Asma'a A'ada'a Aljism Kamila 'Complete List of Human Body Parts' Salem (2023)	Primary source for the human-part names in Arabic
The Mize Car Maintenance Services webpage (accessed: 24/7/2023, https://mize.com.sa/خدماتنا)	Provides a car maintenance perspective on embodiment
The 7esl.com list of parts of the body (accessed: 24/7/2023, https://7esl.com/parts-of-the-body/)	Secondary source for human-part names

The dictionary of verbs includes hundreds of verb entries that were manually gone over and added to a list of 316 embodiment verbs. This list included verbs that describe actions and states carried out and experienced by humans; hence, they are embodiment verbs. Additionally, the Complete List of Human Body Parts by Salem (2023) was used as well. After that, the next step was creating phrases that included the word السيارة/*alsayaara* ("car") along with the verbs or part names in the lists. Using the Google search engine, the researcher searched for each of these phrases online, and all the results were considered until valid examples of using the phrases to indicate a car's action, state, or part were found. When the used phrase was found, it was included in the more specific lists of car embodiment verbs and nouns found in Table 1. It is worth mentioning that the Metaphor Identification Procedure (MIP) created by Pragglejaz (2007) was adopted throughout the process of identifying metaphors to enhance the systematicity of metaphor identification. MIP works as follows:

1. Read the entire text to establish a general understanding of the meaning.
2. Determine the lexical units in the text discourse.
3. (a) For each lexical unit in the text, establish its meaning in context—that is, how it applies to an entity, relation, or attribute in the situation evoked by the text (contextual meaning). Take into account what comes before and after the lexical unit.

   (b) For each lexical unit, determine if it has a more basic contemporary meaning in other contexts than the one in the given context. For the researcher's purposes, basic meanings tend to be:

   —More concrete; what they evoke is easier to imagine, see, hear, feel, smell, and taste.
   —Related to bodily action.
   —More precise (as opposed to vague).
   —Historically older.

   Basic meanings of the lexical unit are not necessarily the most frequent meanings.

   (c) If the lexical unit has a more basic current–contemporary meaning in other contexts than the given context, decide whether the contextual meaning contrasts with the basic meaning but can be understood in comparison with it.
4. If yes, mark the lexical unit as metaphorical. (Pragglejaz Group, 2007, p. 3)

As for number three in the MIP, the Alma'any online dictionary was used.

Some[4] of the tokens found online are given as examples and further analyzed in the analysis section. The reason for using pre-existing online data is to promote the authenticity of the data. In addition, online sources are original texts that are easy to collect and can be accessed by the author and readers; hence, they promote research reliability. The usage of

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[4] Not giving all the examples is due to the space limitations of a journal article.

tokens found online was analyzed with reference to the CMT. Following seminal analytical works, such as the analysis in Lakoff and Johnson (2003), the reason for the metaphorical mapping was attributed in part to the characteristics of the domains responsible for the mapping.

It should be noted that metaphorical mapping is based on multiple factors, such as sociocultural, structural, and ontological factors, as shown in several of the studies cited in the literature review section. These factors were considered and discussed according to the data in the present study. The focus of this paper is on the effect of human and animal bodies on the choice of car-related metaphors and the role played by some structural, ontological, and sociocultural factors in the choice of these metaphors as represented in action and state verbs and human-part names.

IV. RESULTS

The car has a figurative "face", "eyes", "brain", and "lungs". The engine, it has a "navel". The car also has a "body", "arms", and a "bottom". In addition, a car can "stand", "walk", "whistle", and "choke". The car can also be "asleep" and "tired". These metaphors can be categorized into three classes: parts, actions, and states. Examples of part metaphors are the "head", "face", "eyes", "navel", "body", "arms", and "bottom". Examples of actions are "choking", "whistling", and "walking". Examples of states include "standing", "tired", and "asleep". Table 2 includes the full list of car embodiment verbs and nouns found:

TABLE 2
THE WORDS FOUND INVOLVED IN CAR-EMBODIMENT

English	Verbs	English	Verbs	English	Verbs	English	Verbs
pride (is proud)	تفخر	seize	تتلقف	stand up	تقوم	accept	تقبل
contain	تستوعب	kidnap	تخطف	work	تعمل	muffle	تكتم
succeed	نجحت	yawn	تتثاءب	float	تعوم	grow	نشأت
win	فازت	tremble	ترجف	meet	تتقابل	be silent	تسكت
win	ربحت	wink	تغمز	pay	تدفع	possess	تملك
lost	فقدت	expose	تكشف	scratch	حكت	get tired	تعب
earn	تكسب	start	بدأت	visit	تزور	get sick	تمرض
be responsible	تتكفل	blink	ترمش	walk	تمشي	be dazed	ذهلت
got involved	تورطت	welcome	ترحب	return	رجعت	stretch	تمددت
intend	تنوي	beat	تنبض	waver	تتعرج	accompany	تصحبك
learn	تتعلم	stutter	تعتعت	crawl	زحف	die	تموت
take refuge	تلجأ	dance	ترقص	go	راحت	drive	تقود
bid farewell	ودعت	play	تلعب	hold	تمسك	scare	ارعبت
study	تدرس	spew	تنفث	ascend	صعدت	inherent	ورثت
gets happy	تسعد	slip away	تفلت	step on	دعست	be alert	تنتبه
defeat	هزمت	march	تقدم	turn one's head	تلتفت	smiling	المبتسمة
oppress	بطش	exit	خرجت	grasp	تلقط	trip	تعرقل
fail	تعجز	face	واجهت	leave	تترك	monitor	تراقب
aspire	تطمح	pass	تمر	calm down	هدأت	Body Parts	
adopt	تتبنى	hit	تصدم	veil	نقاب	skeleton	الهيكل
simplify	تبسط	serve	تخدم	utter	تنطق	skin	الجلد
fail	تفشل	scream	تزعق	sniff	تشم	Tissue	النسيج
decline	رفضت	take	تأخذ	scream	صاحت	Brain	المخ
oppose	تعاند	run	تجري	see	رأت	belly	بطن
punish	عاقبت	shiver	ارتعاش	feel	تشعر	brain	الدماغ
makes available	توفر	depart	ترحل	swallow	بلعت	back	ظهر
handle	تتولى	pluck	قطفت	chew	تمضغ	muscles	الجهاز العضلي
maneuver	تباغت	sneeze	تعطس	eat	أكلت	thigh	فخذ
exert	تكد	return	عادت	drink	تشرب	lungs	الرئتان
vex	تغيظ	race	سبقت	exhale	زفرت	bones	العظام
survive	نجت	strike	تضرب	watch	تنظر	face	وجه
seek	تسعى	hug	تعانق	bite	قضم	bottom	مؤخرة
wonder	تعجب	travel	تسافر	breath	تتنفس	lens	العدسة
understand	تفهم	slap	تلطم	spit	تلفظ	heart	القلب
sway	تترنح	stride	سارت	face	توجهت	joints	المفاصل
carry	تحمل	handshake	يصافحون	sit	جلست	eyelash	رموش
go	ذهبت	make way	تفسح	receive	تلقى	basin	حوض
wound	جرحتني	step	خطت	stay	بقيت	eye	العين
escape	فلتت	dive	غطست	reach	بلغت	arm	ذراع
come	أتت	come	جاءت	sit	تقعد	hind	خلفية
fight	تعاركت	hug	تضم	sleep	ترقد	navel	صرة
laugh	ضحكت	point	تشير	die	هلكت	knee	ركبة
go away	تبتعد	follow	تلحق	sleep	نامت	mouth	الفم

The target domains represented by the words for car actions, states, and parts in Table 2 are better referred to by using more easily conceived terms that are already in use in the language, which may explain the use of human or animal body parts. In Arabic, the car is construed as a human standing on its four limbs or as an animal standing on its feet, constituting a metaphorical system for naming car parts and expressing some actions and states thereof through the conceptual metaphor THE CAR IS A HUMAN/AN ANIMAL. Tires are limbs or feet. A car also has arms, a face, eyes, a bottom, and a body. A car can also adopt, run, shiver, and survive, for example. The fact that cars replace older transportation means, for example, horses or camels, and even human beings, could be a motivator for this metaphor.

This relatively large-scale car embodiment is attributed to the ontological process of concretizing car parts and/or the structural process of building up a structure of parts, actions, and states. This figurative mapping is economical in creating a reference when conversing about inventions with no custom-coined terms, as is the case with car-related concepts. In the case of car embodiment, referring expressions are borrowed from a similar entity that is already familiar to the laypeople of that society. The following are the entailments and meanings of the conceptual metaphors A CAR IS A HUMAN or ANIMAL and CAR PARTS ARE HUMAN or ANIMAL PARTS, discussed above:

1. The car's front is its "face" and the headlights are its "eyes".
2. The tie rod ends are "arms".
3. The undercarriage of the car is its "belly".

Researchers found 147 car embodiment metaphors out of 316 general embodiment verbs, and 28 car embodiment metaphors out of 145 of all the body part names. Verbs are more commonly used than body parts to describe cars, with 46% and 16% usage, respectively. Consider Charts 1 and 2.

Chart 1. Embodiment Verbs   Chart 2. Embodiment Body/Part Names
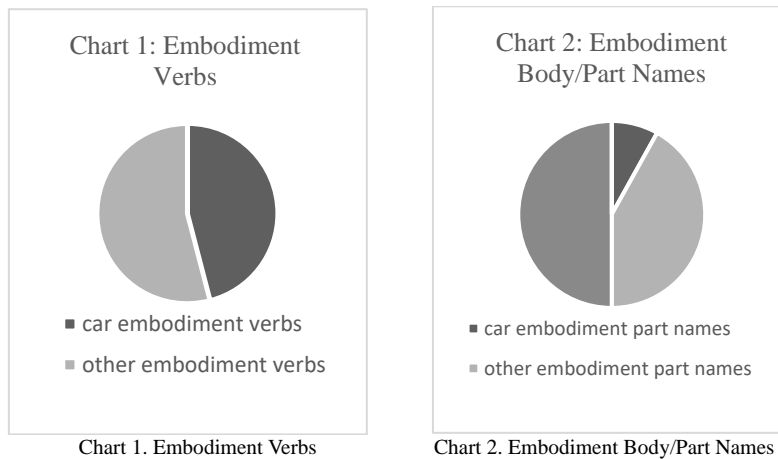
Car parts were found to reflect functional and formal types of embodiments. Consider examples (4 and 5).

4. فلتر الهواء أو رئة السيارة إن جاز التعبير الكثير منّا يغفل عن أهميته

filtər	alhawaʔ aw	riʔat	as:ajarahʔin	ʒaza	at:aʕbi:r	alkaθi:r	min:a
filter	DEF-air or	lung	DEF-car if	permissible	DEF-expression	DEF-a-lot	from

jaɣfal   ʕan   aham:ijatih
look-away   of   importance

"Many of us ignore the importance of the air filter, or car lung, so to speak."

Notice how the forms of the air filter and lung are different while they both function to filter the air going to the car engine and human heart. Interestingly, the car engine was called the heart of the car in some of the examples found online.

Figure 1. Comparison of the Car Air Filter (Left) With the Human Lungs (to the Right)
https://www.artofmanliness.com/skills/manly-know-how/how-to-change-your-cars-air-filter/ and
https://www.istockphoto.com/vector/lungs-anatomy-human-internal-organ-gm1214263236-353209397
(Accessed: 14/7/2023)

5. هناك الكثير من الأسباب التي تؤدي إلى تعطل ركبة السيارة

Hunak	alkaθi:r	min	alʔasbab	al:ati	tuʔad:i ʔila
There-are	DEF-a-lot	from	DEF-reason-PL	which	lead to

taʕaTul	rukbat	as:aijarah
break-down-GER	knee-POSS	DEF-car

"There are a lot of reasons leading to the breakdown of the ball joint of the car."
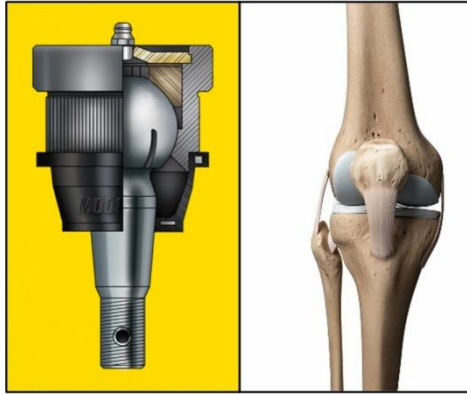
Figure 2. Comparison of the Balljoint (Left) With the Human Knee (Right)
https://www.moogparts.com/parts-matter/all-about-ball-joints.html and https://sciencephotogallery.com/featured/switch.html?catalogid=f0082467
(Accessed: 14/7/2023)

Example 6 represents a function expressed by the verb ترجف/*tarjaf* ("tremble").

6. واذا خففت السرعة أحيانا ترجف السيارة

waʔiða	xaf:faft	as:urʕa	ʔaħjanan	tarʒif	as:aijarah
and-when	slow-down-GER	DEF-speed	sometimes	tremble-3rdSG	DEF-car

"And sometimes the car trembles when slowing down."

Example 7 represents a metonymy when in one domain there is the human being starting the invention of the first car and on the other there is the car as being volitionally starting its own invention. The verb used to represent the embodiment is بدأ/*bada* ("start").

7. هل سألت نفسك يوما كيف بدأت السيارة؟

hal	saʔalt	nafsak	jawman	kajfa	badaʔat	as:aijarah
have	you-asked	yourself	day-SG	how	start-PAST	DEF-car

"Have you ever wondered how cars (as an invention) started?"

Notice how verbs are used either to indicate functional features or a metonymy.

The term "engine head", sometimes called the "cylinder head", has been commonly applied since the common use of the internal combustion system around the end of the 1800s and into the beginning of the 1910s. This is based on the data in the Corpus of Historical American English (COHA). This means that the referring expression was coined to make the reference to this head familiar. Notice here that the word "head" is very productive and common in referring to objects that share some characteristics of the human, or animal, head. For example, the word "head" is used in the following phrases: the "head" of cabbage, the "head" of a company, and the "head" of a pin. In these examples, the shared features of the human head can be the bulky shape, the chief controller, and the topmost position, respectively. This head metaphor is also used in Arabic. Consider Example 8:

8. وديتها ورشة وقلت له افتح راس المكينة

wad:etaha warʃa	waqult lah	iftaħ	ras	almaki:nah
I-took-it-to workshop	and-said to-him	open	head	DEF-engine

I took it to a workshop and told him to open the engine head. www.assayyarat.com (Accessed: 5/4/2022)

The "head of the engine" metaphor in Arabic was potentially introduced to the language due to the shared conceptualization of the human head, standing for the chief controller of the car, which is the engine, and its bulkiness, as shown in Figure 3.
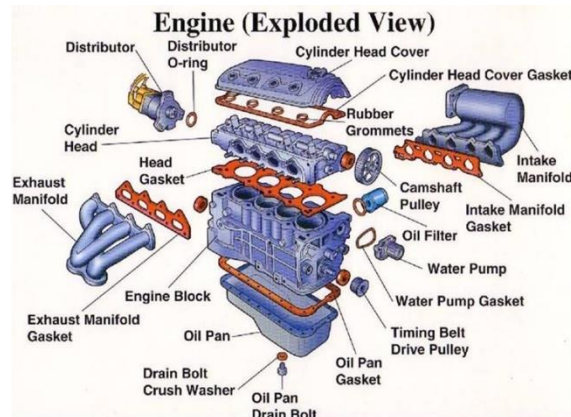
Figure 3. Engine Parts
https://learnmech.com/ic-engine-major-parts-and-its-function/
(Accessed: 14/1/2024)

The possibility that the term was introduced to the language as a result of car knowledge transfer cannot be disregarded. This is due to the fact that cars and their parts were initially imported into Saudi Arabia and not manufactured locally to a significant degree[5].

Related to and attached to the head of the engine, Saudi Arabic speakers use the metaphor "engine head face", as briefly mentioned earlier in this paper. Consider Example 9:

9. وجه راس المكينة خربان عندي من سنة

waʒh   ras   ilmakinah   χarban   ʕindi   min   sanəh
face   head   DEF-engine   not-working   with-me   from   year
"The engine head's face (head gasket) is broken" www.assayyarat.com (Accessed: 5/4/2022).

According to the online Oxford English Dictionary (OED), this metaphor is motivated by the sense of the word "face", which is "the front part of the head".

The "engine face" in Arabic is the part that is attached to the head of the engine and is equivalent to the "head gasket" in English. The connection between the head gasket and the human or animal face can be seen from the point of view that the engine head is looking downward. This point will be revisited later in this paper when considering the whole car as a "body".

Using the Google search engine, the researcher found thousands of Arabic tokens of وجه/*wajah* ("face") referring to the front of the car. Although there is an embodiment metaphor attached to such a referring expression, this metaphor does not share the same target domain that is used when using "car face" to refer to car parts in Arabic. Consider Example 10:

10. أثناء السفر بالسياره تتعرض السياره لرياح وأتربه شديده مما يسبب خدوش في وجه السياره

ʔθna'a   as:afər   bis:aijarəh   tataʕar:aD   as:aijarəh   lirijaħ
During   DEF-travel   by-car   get-exposed   DEF-car   to-wind-PL
wa'atribəh ʃadidəh   mim:a   yusab:ib χudu:ʃ   fi   waʒh   DEF-is:aijarəh
and-dust strong   which   cause-V scratch-PL   in   face   the car
"While driving the car, the car gets exposed to severe wind and dust, which may cause scratches on the face of the car (the front of the car)" www.assayyarat.com (Accessed: 5/4/2023).

The metaphor "car eyes" is also on the list of embodiment metaphors. Although this metaphor was used to indicate the headlights of a car, the more recent usage of this metaphor has its target domain corresponding to different types of sensors. Consider Examples 11 and 12:

11. يبسّط فيه المصممون شكل ووظيفة مصابيح الإضاءة الأمامية، "عيون" السيارة

jubasiT   fihi ilmuSam:imu:n   ʃakla   wawaZifət   maSabi:ħ   al'iDa'ətə   al'amamijah
simplify-V-3rd in-it DEF-designer-PL   form   and-function   headlight-PL   DEF-light   DEF-front
ʕuju:n   as:aijarah
eye(of)-PL DEF-car
"Designers simplify the form and function of the headlights 'the car eyes'" www.media.gm.com (Accessed: 5/4/2022).

12. هي *عيون السيارة* ذاتية القيادة LIDAR يمكننا التفكير في أن .

Jumkinuna at:afki:r   fi   an:a   'LIDAR' hija   ʕuju:n   as:ajarata   ðatijata-alqijadah

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We-can   DEF-think   in   that   LIDAR   is   eye(of)-PL DEF-car   self-driving

"We can think of LIDAR as the eyes of the self-driving car" https://www.kia.com/nmc/ar/discover-kia/ask/are-self-driving-cars-the-future.html (accessed 24/7/2023).

Using the referring expression عيون/*ayoon* ("eyes") for the referent "headlights" indicates the form where the headlights are positioned on the sides resembling a face with a nose and mouth. Conversely, using عيون/*ayoon* ("eyes") to refer to "LIDAR" indicates the function of the LIDAR device, where it is used to deliver information about the space in front and what exists in it. Regardless of the different types of information comparing eyes and LIDAR, it is noteworthy that this is a recent usage of the term in relation to cars due to its recent commercial production in 2017 model vehicles (Xiaoxi, 2022). Hence, it is logical to use Roman letters in the Arabic sentence to denote the target domain device.

Although "eyelashes" and "eyeliner" are not parts of the human body, while scrolling through online search results, the researcher found that both of these terms are used to refer to what resembles the forms of applying "eyeliner" and having "eyelashes" on the car's eyes that correspond to the form of the headlights. Consider Examples 13 and 14:

13. شمعات مكحلة بعدسات نظيفة جدا
ʃamʕat   məkaħ:aləh   biʕadasat   naZi:fətən   ʒid:an
candle(lit.)-PL   eyeline-V-PAST   with-lense-PL   clean   very
"Eyelined headlights with very clean lenses" www.ksa.shofey.com (Accessed: 5/4/2022).

14. تعرَّف على أفضل صفقات رموش السيارة
Taʕar:af   ʕala   afDəl   Safaqat   rumuʃ   as:ajiara
Recognize on   best   deals   eyelash   DEF-car
"Know the best deals on car eyelashes" www.amazon.ae (Accessed: 5/4/2022).

Car "eyeliner" and "lashes" have only recently been introduced in the car accessory business, appearing on shopping and social websites but not in books (a Google search revealed no such tokens in books). One possible reason for this use of the referring expression "eyelashes" in Arabic is that the car metaphor considered above has become established in the car parts industry as a structural metaphor in which different features of the human eye and related concepts, such as eyeliner and eyelashes, are projected onto the car headlights. It is worth mentioning that the eye in Arabic culture is considered a symbol of beauty and charm, and the eyeliner indicates "added beauty", especially if the eyes are naturally "eye-lined" with kohl. This suggests that the beauty of cars is highlighted using the metaphor HEADLIGHTS ARE EYES and eye-related concepts in Arabic.

The car's "body" in Arabic is obviously borrowed from English, as is clear from the transliteration of the English term into Arabic, pronounced with the Arabic vowel /u/ as in /budi/[6] as an Arabicized version of "body". Consider Example 15:

15. هل تلميع بدي السيارة وداخلها يأثر؟
hal   talmi:ʕ   budi   as:aijarəh   wadaχilaha   ji'aθ:ird
Q-word polishing   body   DEF-car   and-interior   harmSG
"Would polishing the car's body and its interior cause any problems?" www.toyota4arab.com (Accessed: 5/4/2022).

This may not be a case of an active metaphor since the transliteration occurs. However, not opting for another term when the English term was first introduced to Arabic can indicate that the metaphor was created in English before it was borrowed. It is also noteworthy that the word "body" is a common transliterated word that can be used literally in Arabic. This could mean that the word "body" was not transferred from English to refer to "the body of the car" but adopted as an Arabic word that was borrowed earlier than the "body of the car" was introduced. The human body is an important participant in the embodiment metaphor, which implies that other human parts are expected to be projected into the target domain. The process of transliteration is not as productive as the coinage of embodiment terms. Other examples of transliteration include مكينة [makinah] ("machine"), جربكس [ʒarabuks] ("gearbox"), and دفرنس [difrans] ("differential"). Notice that these transliterations are of large parts that include smaller ones. More on transliteration follows in the next chapter.

In the case of the word خلفية السيارة [χalfijatəs:aijarəh] ("car's back"), it refers to the rear part of the car (remember THE CAR IS A HORSE metaphorical system), while it may also refer to the actual bottom of the car. Consider Example 16:

16. كاميرا مثبتة على خلفية السيارة
kamira   muθab:atəh   ʕala   χalfijatə as:aijarəh
Camera   fix-ADJ   on   back   DEF-car
"A camera is attached to the back of the car" https://mostaqbal.ae/ (Accessed: 5/4/2022).

Moreover, there is another word that is synonymous with خلفية [χalfijat] ("back") in the context of car parts, which is مؤخرة [muʔaxirat] ("bottom"). Consider Example 17:

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[6] The pronunciation of /budi/ is found in videos when talking about the body of the car. An example can be found at https://www.youtube.com/watch?v=wHUqbYLeeQc&t=9s.

17. عندما تقترب مؤخرة السيارة من الرصيف، والتي تكون السيارة وقتها تقف بشكل زاوية حادة على الرصيف، يجب التأكد من اجتياز مقدمة السيارة

ʕindama taqtarib	muʔaxirat	as:aijarah	min	ar:aSi:f	wal:ati
when get-close	bottom	DEF-car	from	DEF-curb	and-which
takun as:aijarah	waqtaha	taqifu	biʃakli	zawijatin	ħa:d:ah
be-FEM DEF-car	and-its-time	stand-FEM-SG	with-shape	angle	acute
ʕala ar:asi:f	jaʒibu at:aʔk:d	min	iʒtijaz	muqadimat	as:aijarah
on DEF-curb	should DEF-confirm	from	pass-GER	front	DEF-car

"When the bottom of the car gets close to the curb and when the car is standing at an acute angle, it should be confirmed that the front of the car has already passed" https://blog.syarah.com/.

Both خلفية [χalfijat] ("back") and مؤخرة [muʔaxirat] ("bottom") refer to more or less the same thing when it comes to the human body. This is also the case in the target domain of the metaphorical mapping, i.e., the part of the car, constituting a match in the feature that locates this part in both the source and target domains.
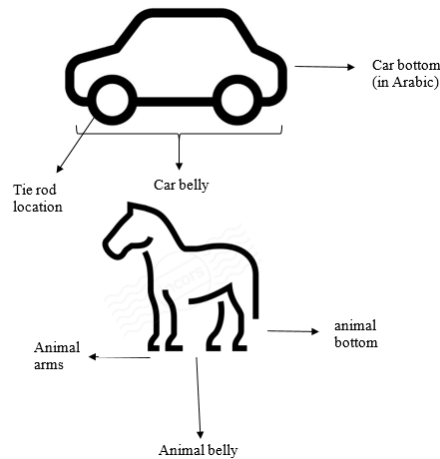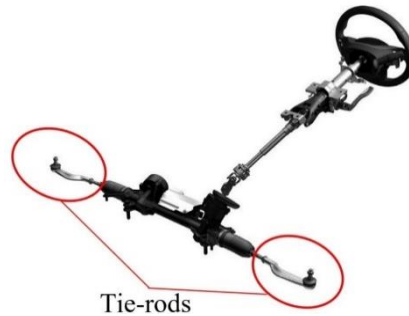

Figure 4. (Locations of Car and Horse Part)[1]

Other parts that reflect car-embodiment metaphors include the arms and navel. Consider Examples 18 and 19:

18. طريقة بدائيه لوزن اذرعة السياره

Tariqatun	bida'ijah	liwazn	aðriʕət	as:aijarəh
method-SG	primitive	for-calibrating	arms	DEF-car

"A primitive way to calibrate a car's tie rods" www.mekshat.com.

19. عندي مشكلة في صرة المكينة

ʕindi	muʃkiləh	fi	Sur:at	ilmaki:nəh
1st-have	problem	in	navel(of)	DEF-engine

"I have a problem with the engine oil drain plug" www.assayyarat.com (Accessed: 5/4/2022).

The tie rods are the arms of a car, and the oil drain plug is the navel in Arabic. When conceptualizing the car as an animal, the bottom of the animal is the back of the car, where the taillights are, and the location of the belly of the car is similar to that of a domesticated animal[7], being below it. Consider Figure 4, above.

According to the online Merriam-Webster dictionary, an arm is "the forelimb of a vertebrate". The location of the arms of an animal, or a crawling human, is where the location of the tie rod is on a car. This can be a result of the car becoming a modern means of transportation, replacing the old means of transportation, i.e., the horse. The form and function of the tie rods resemble those of human arms. Consider Figure 5.

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[7]A domesticated animal such as a horse, cow, sheep, etc., which are four-legged and live alongside humanity; hence, experienced by humans.

Figure 5. Car Tie Rods
https://hondanews.com/en-US/honda-automobiles/releases/releasef208666ebede149755e901516f00ff28/photos/200
(Accessed: 5/4/2022)

The location of the oil drain plug is similar to the location of the human navel when construing the oil pan as the belly. Consider Figure 6:
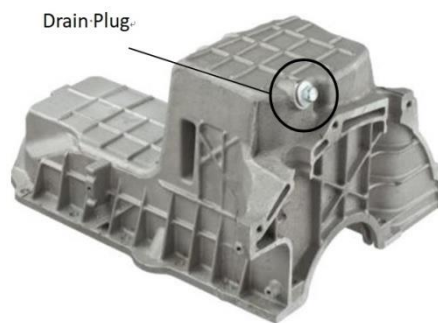

Figure 6. Drain Plug Location on an Upside-Down Engine Oil Pan
https://www.stockwiseauto.com/atp-103155-engine-oil-pan?Year=2001&Make=Oldsmobile&Model=Bravada
(Accessed: 5/4/2022)

This location is slightly different in different engines; however, an opening in the bulky body of the oil pan, the metal body in Figure 6, reflects the similarity between the human belly and the oil pan. A WHOLE FOR PART metonymy is used in this metaphor, where the navel is related to the whole engine in Arabic, 'صرة المكينة' [Sur:atalmakinah] ("the navel of the engine").

Moving to the other categories listed above, the metaphorical terms of actions and states, the metaphors "the car stands", "whistles", and "the car is tired", are all used in Arabic. Consider Examples 20 to 22:

20. تشغيل المكيف والسيارة ماشية
taʃɤi:l almukaijf was:aijarəh maʃijəh
operating DEF-air conditioner and-DEF-car running
"Switching on the AC while the car is walking (running)" https://toyota.montada.haraj.com.sa/ (Accessed: 5/4/2022).

21. السيارة تصفر اول ما اشغلها
as:aijarəh tiSaf:ir auwal ma aʃaɤ:ilha
DEF-car whislt-3rdSG once that 1stSG-start-TR-3rdSG
"The car whistles when I start it" www.assayyarat.com (Accessed: 5/4/2022).

22. احس السيارة تعبانه مافيها حيل تمشي
Aħus as:aijarəh taʕbanəh mafiha ħe:l timʃi
I-feel DEF-car tired NEG-in-it strength walk-V
"I feel that the car is tired (malfunctioning); it can't walk" http://www.s-oman.net/avb/archive/index.php/t-288525.html (Accessed: 5/4/2022).

In Example 20, human walking is projected onto car movement, where a car is in the process of moving when the air conditioner is turned on. Despite cars being supported by four rolling wheels for movement, this metaphor is entrenched in the lexicon and is commonly used by both automotive professionals and the general public. The metaphorical expression "the car walks" in Arabic has a corresponding equivalent in English, which is "the car runs". This parallel is evident in the conceptual metaphor CARS MOVE AS HUMANS/ANIMALS.

Example 21 illustrates how a sound that is less entrenched in the mind can be associated with a more familiar sound, such as the sound of whistling. Whistling is a behavior exhibited by humans and many birds. This act is projected onto objects where friction results in squeaking or screeching sounds. Friction is a natural outcome when a car is in motion, as the car's functionality relies on movement and friction.

In Example 22, the feelings and states of tiredness experienced by humans and animals are projected onto cars. The logic behind this projection is that when someone is tired, they cannot complete tasks properly, a logic that can be applied to cars when their performance is not as expected. Notice that although the concept of human tiredness is abstract, it is used as a source domain due to the fact that it is more entrenched in the language than the concept of not performing as expected in cars. This concept of being tired, indicating not working properly, can also be extended to other devices and machines, such as washing machines and computers, in Arabic.

The car is also conceptualized as a human when it chokes. Consider Example 23:

23. ماهو المقصود بمصطلح ((السيارة شرقت)) او ((السيارة مشرقة؟))

Mahuwa	almaqSu:d	bimuSTaləħ	as:aijarəh	ʃar:aqət	aw as:aijarəh	mʃar:iqəh
what	meant	by-term	DEF-car	choke-on-water	or DEF-car	choked-on-water

"What does it mean when saying the car is choking on liquid?" https://satfrequencies.com/answers/73491 (Accessed: 5/4/2022).

The "car-choking" metaphorical expression indicates that "A choking car does not start." This "choking" is related to the triangle of fire the car combustion engine requires; not starting means not combusting completely. Consider Example 24:

The metaphor "an asleep tire is a flat tire" is used in Arabic.

24. بعد أسبوع لقيت الكفر نايم عبيته هوا

baʕd	usbu:ʕ	lage:t	alkafər	naijm	ʕabetəh	hawa
after	week-SG	found-1stSG	DEF-tire	sleeping	filled-3rdSG	air

"A week later, I found the tire flat, and I inflated it" http://www.mekshat.com/vb/archive/index.php/t-627561.html (Accessed: 5/4/2022)

Example 24 shows that embodiment affects car parts as entities independent from cars.

The state of being "asleep" also indicates the situation when cars have not been used for a long time. Look at Example 25:

25. هذه السيارات نامت لمدة نصف قرن في إحدى الملكيات الخاصة غرب فرنسا

haðihi	as:aijarat	na:mat	limudat	niSf	qarn	fi	iħda
this	DEF-car-PL	sleep-PAST	for-a-while-of	half	century-SG	in	one-of

almilkijat	alxaS:ah	ʁarb	faransa
DEF-possession-PL	DEF-private	west	France

"These cars have slept for half a country in a private property west of France" https://arabic.euronews.com/culture/2015/02/06/record-prices-expected-at-sale-of-baillon-car-collection-in-paris (Accessed: 5/4/2022).

Considering another list of car-related terms (https://mize.com.sa/خدماتنا, accessed 4/7/2023) from a car maintenance perspective, technicality played a significant role in blocking the embodiment in the society of Arabic users. See Table 3:

TABLE 3
CAR PART NAMES IN ENGLISH WITH ARABIC TRANSLITERATIONS OF INVENTOR'S TERMS

Inventor's Term	Transliterated Term in Arabic with Phonetic Transcription	Alternative Coined Term in Arabic	Literal Meaning of Coined Term
gearbox	جربكس/ʒarabuks	مبدل السرعة/mubad:ilas:urʕah	speed shifter
machine	مكينة/maki:nah	محرك/muħar:ik	mover
sensor	سنسور/sinsər	حساس/ħas:as	sensor
body	بودي/budi	جسم/ʒism	body
differential	دفرنس/difrans	-	-
clutch	كلتش/kalatʃ	-	-
radiator	رديتر/ridetər	-	-
coil	كويل/kuel	-	-
cutout	كتاوت/katauit	-	-
timing (belt)	تايمن/teman	-	-
cylinder	سلندر/silindar	-	-
tank	تانكي/tanki	-	-
crank	كرنك/krank	-	-
hand brake	الهندبريك/handbrek	-	-
self-starter	سلف/silf	-	-
chassis	شاص/ʃaS	-	-

Of the examples in Table 3, the first four parts of the schedule have two alternating referring expressions, each in Arabic. The last twelve referring expressions are only referred to with an English to Arabic transliteration each. The meanings of the first and second, جربكس [ʒarabuks] ("gearbox") and مكينة [maki:nah] ("machine" or "engine"), respectively, have alternative coined terms indicating embodied functions. The meaning of the third one, سنسور [sinsər] ("sensor"), indicates an embodied state. The meaning of the fourth one, بودي [budi] ("body"), indicates an embodied

shape. Notice that the rest of the examples are technical; hence, they cannot be embodied for lack of matching functions, states, or shapes.

V. DISCUSSION AND CONCLUSIONS

In previous studies on car embodiment, cars were used as source and target domains in metaphorical mapping. Those metaphors were utilized to indicate intimacy and heroism when cars were the target domains, as in, for example, the research of Živković (2014). On the other hand, these metaphors were used as highlights of human traits, such as being powerful and corrupt, for example (Notar, 2014).

When collecting the data for the current study, some words were not found involved in conceptual car embodiment mapping due to the technical nature thereof. Examples of this are جربكس [ʒarabuks] ("transmission/gearbox") and عمود التوازن [ʕamudat:awazun] ("sway bar"). The word جربكس [ʒarabuks] ("transmission/gearbox"), similar to the case of Example 15, above, is a mere borrowing of the English-referring expression "gearbox". The word عمود التوازن [ʕamudat:awazun] ("sway bar"), which literally means "balance rod" in Arabic, describes the function of the part. Another reason for not using them can be attributed to the structural and ontological infeasibility of using the embodiment, which also applies to the examples of "transmission/gearbox" and "sway bar".

In the current study, car parts, actions, and states were found to be referred to by expressions that are literally used to represent human and animal parts, actions, and states. Consider the following list, which includes examples of the tokens studied:

1. engine head	5. car's body	9. whistle	13. engine's navel
2. car eyes	6. car's bottom	10. choke	14. car arms
3. car eyeliner	7. stand	11. tired	15. asleep tire
4. car's face	8. walk/ride/drive/run	12. head's face	

Finding that many of the car-related conceptual metaphors are driven by embodiment supports the concept introduced by Lakoff and Johnson (1999) and Langacker (2008), which is that the peculiarity of bodies tends to feed the source domains of metaphors. Other car-related metaphors highlighted in the literature, such as those in Katz (2000), Young (2001), Dant (2005), Živković (2014), and Notar (2014), were not found in the car parts or related concept data. This suggests that the importance of embodiment in enhancing the effectiveness of human communication not only serves to emphasize human attitudes and values but also extends to enhancing other aspects of language, including the technical register.

The social motivation behind the car's metaphorical embodiment can be observed in connection to the historical transition from animal-based transportation to cars. This shift in transportation reflects the use of animal forms to represent the function and design of older modes of transport. This phenomenon is expected to be prevalent in various societies worldwide due to the widespread transition from animal-powered to car-powered transportation. This trend is the primary focus of the study, as illustrated in Table 1. Another social factor contributing to the use of this metaphor is the adoption of English car part names in Arabic-speaking countries as cars and their components are imported. This adoption is evident in the transliteration of English terms into Arabic. Examples of transliterated terms include مكينة/makina ("machine"), جربكس [ʒarabuks] ("gearbox"), and دفرنس [difrans] ("differential"). Consider Table 2 for other examples and comparisons.

The motivation behind this embodiment was primarily driven by the recent invention of cars and the practicality of utilizing existing terms instead of creating new ones when structuring a framework for referring to car parts, actions, and states. When the target domains are abstract and people make them concrete to help promote convenient reference, the motivation is ontological. Human and animal body parts were employed to categorize car components in order to conceptually align formal and/or functional attributes. On the other hand, human and animal actions and states were utilized to structure the functional aspects of car actions and states.

The metaphors in the list above indicate that their metaphorical meanings exist on a semantic level. This is according to the prototype notion explained by Fillmore (2006), Brugman and Lakoff (2006), and Geeraerts (2016), among others. For example, the lexical-level meanings of the words head, eye, and face are "the upper or anterior division of the animal body", "a specialized light-sensitive sensory structure of animals", and "the front part of the head in humans" (Merriam-Webster Dictionary, accessed 4/7/2023), respectively. While the semantic level meanings of these metaphors are the "topmost part of an engine core", "the headlight of a car", and "the front part of the car", respectively.

The percentage of car embodiment verbs among all embodiment verbs is relatively higher than the percentage of part names (46% compared to 16%, respectively). This is attributed to the limited forms of car parts when compared to the less limited functions and metonymies verbs can represent as source domains in embodiment metaphors.

The question of how similar car embodiment is across languages is interesting, but it is beyond the scope of this paper. Future research could explore this question by analyzing car embodiment metaphors in languages other than Arabic. This would help to expand the validity of the conclusion, but it is important to remember that the influence of embodiment on culture is not always straightforward. As Kövecses (2004) has argued, embodiment can sometimes melt social barriers, making it difficult to predict how car embodiment will be expressed in different languages.

Looking into car-related concepts in Arabic and English over time and exploring how they have influenced our perception of cars, would be a valuable direction for future expansion of the current paper.

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