Phonetically Motivated and Phonetically Unmotivated Assimilation in Quran Tajweed Rules

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Abstract
The recitation style of Quran known as "tajweed" follows certain age-old practice embodied in phonetic specifications. Over the past millennium, explications of the principles (or rules) of tajweed have been recycled again and again in literally hundreds of publications of varied length and detail. However, and probably out of obvious veneration for Quran, the phonetic rules of the tajweed enterprise have never been subjected to academically-based phonetic scrutiny, let alone critique. This has been the state despite the fact that "tajweed" تحريف الألفاظ The term tarteel ترتيب الألفاظ (careful reading) and few other terms of similar meaning are used. The purpose of this essay is to problematize the need for such scrutiny. This article focuses only on one set of tajweed rules subsumed under idghaam إذاعمة (consonantal regressive assimilation). The study has culled relevant data and propositions of received wisdom from the sources and has also identified sub-types of assimilation which are not in consonance with current (twenty-first) phonetic scholarship.

Keywords: Quran, Tajweed rules, phonetics, (un)motivated assimilation rules

1. Introduction: Recitation of the Holy Word / Scripture
A desire to vocally immortalize the holy word without relinquishing or compromising the status of the written word can be observed among followers of the various faiths. (Kelber, 2007:2) Furthermore, 'Recitation or reading aloud of scripture is a common feature of piety in virtually every scriptural tradition', so Graham emphasizes (1987:65). Evidence to this effect comes from the tradition of Hellenistic pagan cults (such as that of Isis), Zoroastrian traditions, Hindu and Buddhist traditions, Chinese and Japanese traditions, and Judeo-Christian traditions (idem: 65-66), besides the Muslim tradition, which is the focal point of this research project. For example, no extant text antedates Panini's (ca. 500 BCE) on the phonetics of the pronunciation of some Vedic traditions (idem: 65-66), and the recitation style of Quran known as "tajweed" Tahfeez الألفاظ The term tarteel ترتيب الألفاظ (careful reading) and few other terms of similar meaning are used. The purpose of this essay is to problematize the need for such scrutiny. This article focuses only on one set of tajweed rules subsumed under idghaam إذاعمة (consonantal regressive assimilation). The study has culled relevant data and propositions of received wisdom from the sources and has also identified sub-types of assimilation which are not in consonance with current (twenty-first) phonetic scholarship.

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2. Tajweed
Tajweed (chanting or cantillation) is a special style of reading Quran with the intent of (?) upgrading the quality of the recitation ac. Two points may be appropriate at this point in the paper. First, the word "tajweed" تحريف الألفاظ is a common feature of piety in virtually every scriptural tradition, so Graham emphasizes (1987:65). Evidence to this effect comes from the tradition of Hellenistic pagan cults (such as that of Isis), Zoroastrian traditions, Hindu and Buddhist traditions, Chinese and Japanese traditions, and Judeo-Christian traditions (idem: 65-66), besides the Muslim tradition, which is the focal point of this research project. For example, no extant text antedates Panini's (ca. 500 BCE) on the phonetics of the pronunciation of some Vedic traditions. The Vedu plural of vedah meaning what is known or knowledge are oral texts and they are also preserved in writing. They have been orally transmitted from generation to generation over the centuries by Brahminic reciters; in fact some consider committing them to writing comes close to jeopardizing their sanctity. (Graham, 1987: 72 and 101) According to Lannoy (1971:192), 'Vedic chanting is a Meta science of sound, mystical prayer, scriptural recitation in Sanskrit ... [which is] performed in tempo.' Graham (1987: 69) gives some detailed description of Vedic chanting in terms of tempo (the unit is laya) and the speed (vrtti) in three degrees. Learning the various elements for the proper rendition of the Vedic hymns fulfills the Buddhist tradition of 'evam me sutan' meaning, thus I have heard. Furthermore, the Judeo-Christian tradition used to have a similar orientation concerning the oral status of the holy writ, but widespread oral recitation has now waned. The written word has surpassed the vocal aspect of the scripture. 'It's in the Bible' is used more frequently than 'God says' (idem: 49 and 120-125). For the Muslims, the Quran stands as 'God's ipsissima vox' (Kelber, 2007:4).
To Muslims, the term 'tajweed' is almost a household term, since tajweed is an element in school curricula and in the activities of mosques and Quran-related organizations and societies.

To most non-Muslims familiar with its existence, the Quran has for long been presented and read as a written text (Nelson, 2001: xvi). It has been the subject of investigation from varied discipline orientations, presentation focus, interpretation, textual structure, and point of argumentation. However, this research article is not about the Quran as a written text. Rather it focuses on certain phonetic processes of vocalization which are specified in sources on the tajweed. Within the general area of Quranic studies, tajweed is subsumed under the rubric of the recitative sciences or sciences of 'readings' (Gade, 2001: 367 and 2009: 485) Tajweed studies and practices focus on: 1) the appropriate sound description for proper pronunciation with reference to the points of articulation, which are called مخارج الحروف. (Leading authors in this respect are, in ascending historical order: (Gilliot, 2006, Leemhuis, 2006, Ž‹)1987:47), Naafi's style is now generally followed in the Arab world. (For details on this issue, please see the research by (Nelson, 2001: xvii). It has been the subject of investigation from varied discipline orientations, not about the Quran as a written text. Rather it focuses on certain phonetic processes of vocalization which are described by Al-Shaatibi, Al-Qurtubi, Bin Al-Jazari, and Al- (Gade, 2001: 55). Indidentally or otherwise, he perpetuated the idea that there are only seven ways of reciting Quran. This number, seven, happens to parallel the number 'seven' in a saying attributed to the Prophet to the effect that revelation of the Quran had been in seven styles, commonly referred to as 'ahruf', i.e., 'letters'.

After the relative standardization of the written form of the Quran on the orders of the third Calif of Islam, Othmaan Bin 'Affaan, certain styles of reading became more popular among the Muslims of particular regions than other styles; still other styles became popular in other regions. Some individuals with strong feelings about maintaining the original oral form of the readings began the process on encoding the description of the readings in writing. The first published work on the authentication of accepted readings is believed to have been done by Ahmad Bin Jubayr Al-Kuufi (died henceforth d.) 258 Hijra. Please note that the dates given are in this calendar, not the solar Gregorian calendar. ). Bin Jubayr canonized five styles of reading, representing the reading styles that eventually evolved in the five cities which received the five Othmaanic codices: Mecca, Medina, Kufa (Iraq), Basra (Iraq), and Damascus (Syria). However that book only charted the road and alerted the protectors (?) of the Quran text to the need for such works. It was followed by the work of Bin Mujaahid (d.324), who described the reading styles of seven reciters, and named two associates for each whom he called the transmitters or describers of that style. His choice of those seven readers has always been upheld, with no challenges. (ن (المحرر) 1987: 13 and 1987: 47), Naafi's style is now generally followed in the Arab world.

Reading on the subject flourished over the next few centuries and matured by the ninth century of the Muslim calendar. Since then, publications on tajweed have been mere annotations and explanations mostly of the canonized readings. Despite the existence of many other sources, the overwhelming majority of the writings have been recycling the tajweed rules described by Al-Shaatibi, Al-Qurtubi, Bin Al-Jazari, and Al-Sakhaawi.( 286 – 285 : 2001 (المحرر) ). The names of those seven readers are listed below, following the their respective cities of association.

1) Medina: Naafi' Bin 'Abd Al-Rahmaan (Al-Madany) (d.169), transmitters: Warsh (d.197) and Qaaloun (d. 220)
2) Mecca: 'Abdullah Bin Katheer (d.120), transmitters: Al-Bazzii (d. 250) and Qunbul (d.291)
3) Damascus: 'Abdullah Bin 'Aamer (d.118), transmitters: Hishaam Bin 'Ammaar (d. 245) and Thakwaan (d.242)
4) Basra: Abu 'Amr Zabbaan Bin Al-'Alaa (d.154), transmitters: Hafs (d.246) and Al-Soussi (d.261)
5) Kufa: 'Aasim Bin Abi Al-Nujoud (d.127or128), transmitters: Hafs Bin Sulaymaan (d.180) and Shu'bah (Bin 'Ayyaash) (d. 193)
6) Also Kufa: Hamza Bin Habeeb Al-Zayyaat (d.156 or 158), transmitters: Khalaf (d.229) and Khallaad (d.220)
7) Also Kufa: Ali Bin Hamza Al-Kisaaii (d.189), transmitters: Al-Douri (d.246) and Abul Al-Haarith (d.240)

countries of the Maghreb and in West African Muslim countries, Bin Al-'Alaa's style in the Sudan and parts of Yemen, and 'Assim's style in Afghanistan, India, Pakistan, Turkey and the rest of the Arab countries. (Unfortunately, no data is available on the rest of the Muslim countries or those with a visible Muslim community.) 'Assim's (Haf's description) seems to be more universally widespread at present (21st century) than the other readings. This is a result of its being universally heard during telecast of Ramadan Taraweeh prayers from Mecca every lunar year for the last twenty years. Nonetheless, the worldwide web-based readings allow the user almost the whole range of the seven or even ten styles. Local, national, regional, and international competitions in Quran recitation are periodically held, with first prizes sometimes reaching six digit figures.

3. Codification of Tajweed Rules

In this section of the paper, the phonetic core in the tajweed practice. Our concern focuses on aspects pertaining to phonetic assimilation, as stated in the objective of the paper above (2nd paragraph in the tajweed section).

The systematization of the rules of tajweed began relatively early in the second century of the Hijra calendar. The earliest to build a corpus of readings was 'Abd al-Qadi bin Salim (d. 222 or 224) in a work with the title of the seven readings (2001:33). As was customary in works on standardization in general (syntax, rhetoric, Islamic law, etc.), the rules of tajweed were composed in poetry, probably to facilitate memorization; the earliest of these poems (51 lines) was entitled (the good quality of oral performance), composed by Al-Khaqaaqani (الكافاني) (d. 325); several others followed in later centuries. About two hundred years later, the longest (1,173 lines) poem on the seven readings was composed by Al-Za'ama bin Fuyyarah Bin Khalaf Bin Ahmad Al-Shaatibi (Al-Ru'iini Al-Andalusi) (d. 590).

He assimilated the /l/ sound to an immediately following /r/ sound as in (2001:53). The short title for the poem is يا شافية. The structure of the poem is highly complex, for he named in the relevant lines a letter for each reader by himself and another symbol (of one or more letters) for each of the varied combination of the readers (on the basis of agreement on the vocalization of a word or on a rule). (See حesh, 2001:292/3 for a sample list of such works). Ten sections in the poem deal with issues pertaining to the focus of this article: 5: complex assimilation, 6: intra- and inter-word assimilation, 13: simple assimilation, 15, 16, and 18: individual consonants at the end of each of /l/ and /n/ of the stem and the suffix marker of indefinite nouns, 24: /r/, and 25: /l/.

Later on, Al-Sakhaawi (d. 643) wrote another poem on the subject, and two centuries after that, Bin Al-Jazari (d. 833) composed a poem in 243 lines specifically for the three additional readings, not described in the Shaatibiyyah. He called it أنثى الأداء. However, he later claimed to have identified new, specific features in the seven readings, which had not been described in his predecessor's work, Al-Shaatibiyyah. The new features led him to rewrite the rules for the ten readings, now in a new poem (1,012 lines) with the title of the 10 readings, which he put out in book form entitled (Promulgating the Ten Styles of Reading). This new format also gained widespread acclaim and has become the second standard reference on tajweed rules. Since the ninth Hijra century (This year (2013 CE ) is 1434 in the Hijra calendar), most instruction in readings is based on either of the two: the Shaatibiyyah and Bin Al-Jazari together or on the Shaatibiyyah by Bin Al-Jazari alone. (2001: 285 – 291). Bin Al-Jazari's work has been explicated in scores of books, like that by Al-Shaatibi.

In the following paragraphs, points of direct bearing on the thesis of this essay are summarized from the key figures in the tajweed project.

First, the work of Bin Mujaahid (d. 324) presented the differences among the seven readings (on the recitation of every verse which they did not vocalize in the same way. (Pp.: 128 – 703).

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In the Naafi' (Agal) style, the sound /th/ (i.e., what occurs in English initially in ُةင်္) was assimilated to an immediately following /d/ sound within the same word as in (Al-Annabi). He assimilated the /l/ sound to an immediately following /r/ sound as in . But nothing definite was apparent about the /l/ sound in the beginning of a following word as in ; similarly, Naafi' had the same position regarding assimilating the /l/ sound to a following /d/ in word-initial position as in .

Bin Kateher, (Agal) on the other hand, assimilated the /l/ sound to /r/ at the beginning of the next word, e.g., .

'Assim's (عاصم) reading was marked by a position similar to that of Bin Kateher on the /l/ followed by /r/, as in quote above.
Bin Al-'Alaa' (ابن العلاء) had a broader base than the other readers on assimilation; he assimilated the /t/ sound at the end of the word feminine suffix to a consonant at the beginning of the noun subject (following the verb) e.g., للنامه. The same applies to /l/ of للنامه (but not the /l/ of للنامه). In addition, to him, the /l/ sound of للنامه in two instances ؛كل بعل عليه ضائعلا، هم. The simple assimilation process is classified into seven sub-categories: 1) those that do not assimilate or cause assimilation, 2) those that assimilate to similar consonants, 3) those that assimilate to similar consonants but do not act as assimilators, 4) those that can assimilate to non-contiguous consonants, and 5) those that can assimilate only to contiguous consonants (p. 97). When the consonants in this complex list are thoroughly examined, there appears to be a mixture or combination of principles at work, e.g., the direction of assimilation (regressive, i.e., anticipatory, or progressive, i.e., perseverative, consonant strength (lenition) or weakness (e.g., fricatives versus stops), and velarization.

In contrast to the compound assimilation process, there is the simple assimilation process, the universal process. However, the tokens to which the process is applied shows inconsistencies, as will be shown below.

The second book of Al-Daany's which deals with the rules of tajweed is The codification of tajweed rules was a major concern of this author. He was a prolific writer on Quranic sciences. His biography lists 119 books, some in more than one volume and others in short booklets. About half of these works deal with issues of tajweed. The following information has come from two of his books: Al-nufuusu (souls) and Al-Kisaa'ii (ألكساندري) assimilated the /l/ sounds in للنامه and للنامه in additional environments e.g., للنامه . Bin Mujaahid presents a longer list of words where Bin 'Aamer was at variance with other readers. (Reproducing the list here does not add to the point of the section.)

Bin Mujaahid ends the section with a paragraph about the /n/ sound in word stems and in the grammatical suffix indicating case on indefinite common nouns (and adjectives, though 'adjective' is never mentioned because it is consider part of the noun class). None of the readers, according to Bin Mujaahid, assimilates the /n/ sound in either of its occurrence types (part of the stem or end of a suffix) when followed by any one of the sounds /ح, خ, ح, ه, ء, غ, ذ/ on the sounds /ح, خ, ح, ه, ء/ Bin Mujaahid reports varied attributions for Naafi'. Then, Bin Mujaahid, and later every other author, points to the common agreement among the readers on assimilating a consonant to its own contiguous occurrence, i.e., the release of the articulator is delayed thus making the sound long or geminated. (Please see Ladefoged and Maddieson, 1999, on consonant length or gemination.)

Another major writer with wide spread circulation of writings and ideas on tajweed is Al-Daani (d. 444). He was also concerned with the seven readings. Below is a sample of such judgments. 1) The use of the glottal stop in the word (موجودة) (closed or locked) (Sura 90, verse 20) is described as ear-piercing to the listeners. 2) Recitation based on that of Bin Katheer's is good, on Naafi's is smooth, on 'Aasim's is well-articulated and pleasing to the ear, on Hamza's only claims to match his style but in fact does not, on Kisaa'ii's is moderate, and that adopting Bin 'Aamer's is the median between extremes. (Idem: 92-94)
intra-category potential for assimilation: the pharyngeals on one hand and the resist on the other. Across word boundary the cluster pair may be identical; in this case, the tongue (or the lower lip in the case of labial sounds) makes a single approach to the point of articulation and is held in that place for a longer time (in milliseconds) than it would for producing either of the two sounds. If the cluster consists of two coronal consonants, then the first member in such a pair is totally assimilated to the second member of the pair. The third possibility is that of partial assimilation (which they call خافة); in such a case partial assimilation operates while maintaining nasality for the blended new sound. (Idem: 99-101) (More on the complexity of this please see below.)

The next section in the book explains the rules for the /n/ sound in both of its possible positions of occurrence. (See above, please.) First, the /n/ is not the object of assimilation to the immediately following consonant if it is any of the following sounds: (لل) as in such phrases:

Al-Daani also points to the loss of nasality from the /n/ when assimilated to /l/ and /r/. (This

a: , except for Hamza. (Idem: 113/4) (Current knowledge lends support to Hamza's support.) On the other hand, the /n/ retains nasality when the assimilation is to /y/ (palatalization) and /w/ (labialization) (which they call iqlaab) when immediately coming before other alveolar / coronal consonants such as /z/, /s/, or /t/ as in such phrases:

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The total assimilation of /n/ in both types (above) to a following /b/, /m/, /l/, or /r/ is also done (it is called iqlaab) when immediately coming before other alveolar / coronal consonants such as /z/, /s/, or /t/ as in such phrases:

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place assimilation (Idem: 165). Another point of disagreement among readers concerns the final /m/ (a nasal bilabial) when it immediately precedes a /b/ (an oral bilabial) sound. Their disagreement pertains to either pronouncing the /n/ followed by the release of the lips (+ juncture) then pronouncing the /b/ or to pronouncing both sounds with one (but longer) closure of the lips (close juncture). (Idem: 166/7)

The third scholarly figure is Al-Shaathibi. Born blind in Shaatibah (Hence the identifying last name), Spain in 538, rose to the status of a great scholar and Hafiz of the Quran. He began writing the tajweed poem in Shaatibah in 572 but finished it in Cairo, where died in 590. It carries the title حجر الأنساني وهو التحفيز في القراءات السبع. He based his presentation on the earlier work of Al-Daani of the seven readings التفسير في القراءات السبع. The work eventually became a standard reference on tajweed. (Idem: 13-15) Al-Daani's's التسبيه was not used above as the base for his work to avoid too much repetition. The format is however different from that by Al-Daani.

In section 14 of the work, the rules for the sound of the word /d/ are presented. The readers did not assimilate this sound to a following /t/ whereas both Aassim and Al-Daani did so. Other readers had varied combinations of the sequences. (Idem: 128) The next sound in section 14 deals with the /d/ sound of the word قد. Readers who did not assimilate the /d/ of this word to a following /t/ or /d/ assimilated it to /n/ while Warsh assimilated it to /d/ or /t/ sound. (Idem: 130) Meanwhile, there was a consensus on assimilating the /t/ sound of the particle /t/ to a following /t/ or assimilating /d/ to a following /t/ as in امانتي قد تم تين, a /t/ to a /d/ as in امانتي قد تم تين

The following paragraphs sum up the agreed points from the above presentation of individual scholars, practitioners.

3.1 Recapping the Phonetics of Tajweed Practices: The Assimilation Processes

As mentioned above the tajweed practices and the rules which the practices have not changed over the centuries. This does not preclude differences among the founders of the tajweed project, nor among the practitioners of tajweed itself. On the whole, the similarities outweigh the differences by far. In this section, the assimilation rules and their phonetic environments are reproduced for the purpose of having an integrated picture on the points of consensus. This survey has traced the most widespread reading at present, that of Aassim, and listeners to this style are very much likely to think of it as the only or only valid style. As can be seen from the following list showing features of consensus among all readers, there are authenticated variants on many aspects. However, I include in the list those features on which four or more out of the seven canonical readers agreed.

1. They all report assimilation to be regressive or anticipatory, going from sound number 2 to sound number 1 in a consonant cluster.
2. On the /n/ sound, whether in the stem or in the affix marker of indefiniteness, they assimilate it completely to all non-pharyngeal consonants including itself. When assimilated to /l/ or /r/, the /n/ loses nasalization.
3. They all assimilate the /n/ completely to a following /b/, thus producing a kind of an /m/ sound with no total closure but with a slightly open aperture, as if it were a bilabial nasal fricative. This process applies to both intra- and inter-word contexts. (The terms in Arabic do not matter, in my view.)
4. The /n/ assimilation rule in 3 above does not apply to the /w/ and /y/ in the following words. 
5. With the exception of two instances in the Quran text جنون البأس وما يستطرون بين القرن وما بين القرن الحكيم, they all assimilate the /n/ sound to the following labio-velar /w/ sound. (With one exception; see 4 above.)
6. They all agree that the /d/ sound of the particle /d/ assimilates to a word-initial /d/ or /t/ sound.
7. They all agree that the /d/ sound of the particle /d/ assimilates to a word-initial /d/ or /t/ sound.
8. The assimilation of the /l/ sound of the particle /l/ and the particle /l/ to the next /l/ or /t/ sound in the following word is common to all reading styles.
9. A word-final /t/ affix marking feminine subject assimilates to any of the following sounds at the beginning of the word /ت/.
10. An /m/ sound in word-final position DOES NOT assimilate to a following voiceless labio-dental...
In the section below, a recapitulation of the current common thinking on issues relevant to the above points draws a general framework for looking into the principles of tajweed presented above. Our main concern points out where the principles do not match.

4. Current Phonetics Thinking on Assimilation

At this point, it is necessary to preempt any possible criticism (however remote it may be) that it is unfair, if not fallacious, to preferentially compare knowledge at two historical stages. In my humble view, it is fallacious to draw the comparison. Therefore, I would like to put it in no uncertain terms that we are not critical of anything in which time and cumulative knowledge are the crux of the issue. In clear terms, it should be emphasized that the phonetic foundation on which the tajweed rules were based centuries ago was the most advanced state of the art foundation in phonetics at the time. No other culture had phonetic sophistication that surpassed that of the (Arab and non-Arab) phoneticians of Arabic and reciters of the holy writ. Therefore, what follows should not be construed as underestimating the efforts put into abstracting from pronunciation (i.e., raw data) rules and schemata of tajweed. Building knowledge is cumulative and scholars depend and build on the work of others before them in time. Therefore, no comparison is being held here. Rather, the developments and advances made by specialists on what their forerunners had offered have led us to the present state of 'advanced' knowledge. Since the nineteenth century (marked by the formation of the International Phonetics Association) and up to the digitization revolution of the twenty-first century, great leaps have been made in phonetic knowledge. Knowledge of speech and sound articulation has been phenomenally multiplied by the use of tape recorders, oscilloscopes, palatographs, and other and more cutting edge technological instruments and techniques (e.g., magnetic resonance imaging (MRI), sonography, digital acoustic analysis, mandibular photography, tone, stress, and intonation representation etc. (Zsiga, 2008: 14, 32-33, and 36)). Such advances have made it possible for the experts to engage in speech synthesis decades ago (in a sub-field of phonetics and electrical engineering called 'acoustics'). Furthermore, laryngoscopy has enabled us to see the vocal folds / cords in action, while the subject is talking naturally, singing, or reciting Quran. It is this kind of knowledge that aids specialists in diagnosing pathological cases and making the appropriate prognosis. Now, there are computer software programs that do phonetic analysis for changing speech into writing and vice versa, i.e., changing a text that is entered in writing onto the desk top screen into speech (speech to text and text to speech, respectively). Now, more ways and means of ascertaining the features of pronouncing sounds in isolation (distinguishing sounds simply by reading spectrograms and examining the formant patterns), words in isolation (i.e., in the citation form), and words in connected speech help investigators to recognize, identify, and contrast what in the past could not be distinguished by objective means. Now, we can see farther (than our academic ancestors did simply) because we are standing on the shoulders of those giants.

The description of sounds in articulatory phonetics proceeds by analyzing spoken language (or speech) into units of hierarchical structures or levels from the phone level up to the discourse level. At the sound level, the units are subdivided into segmental and prosodic or supra-segmental elements. At the segmental level, a speech sound consists of a number of features or values, some of which are shared by other sounds. (Ladefoged and Maddieson, 1999:5) The shared features allow theoreticians to classify sounds into classes. Since our concern here is with consonants, the features that are relevant for this discussion are:

1. whether the air stream is released from the oral or nasal cavity determines orality and nasality of the consonant, (oral consonants by far outnumber nasal consonants),
2. the part of the lower jaw (the lower lip and the tip (apex), front (lamina), the blade, or the back of the tongue) that moves toward a target point or region in the upper jaw, (the active articulator)
3. the point or region which is the target of the active articulator, (the passive articulator, the point or place of articulation); to specialists there are 15 – 18 points of articulation from the lips to the vocal folds/cords, and whether the air stream is released over the sides or the center of the active articulator (producing the laterals and the center consonants),
4. the extent of blockage to the air stream between the active and passive articulators (commonly called 'manner of articulation); the closure may be total (producing stops), nearly total (producing fricative), begins total and then decreases to make friction (producing affricates), or a little more than friction-generating blockage (producing approximants, the /y/, /w/, and for some specialists /r/, and
5. the activity (or lack thereof) of the vocal folds /cords (producing voiced or voiceless consonants).

In the following, the discussion relates to consonants only, though vowels influence each other, in the process termed 'vowel harmony' (التتابع وهم فيها خالدون).

Theoreticians consider the influence of neighboring consonants on each other to be the result of the speaker's desire for expending less effort and saving on the time needed for the pronunciation of the individual phoneme. (Whereas the speaker tends to save on effort and time (a tendency toward saving), the listener tends
toward the same principle but as it is related to the perception of speech, desiring maximal distinction of pronunciation. Eventually, a balance between the expectations is struck. (Jun, 1995) Speakers of all languages engage in some kind of assimilation leading to consonant cluster simplification, but they may not be aware that they are doing so. (Collins and Mees, 2008: 115/6)

The direction of assimilation may be forward in the linear flow of sounds, i.e., progressive/perseverative, or it may be in the opposite direction to the linear flow, i.e., regressive/anticipatory. Both types of direction of assimilation occur in languages, but some languages seem to display a higher level of incidence in a direction than in the other. English speakers, for example, favor the anticipatory/progressive type whereas the French and the Italians favor the perseverative/progressive type (Ladefoged, 1993: 56). That is, while the assimilation process depends on objective phonetic conditions, its activation, extent of application in terms of type and token, and patterns of assimilation depend on subjective social choice. (Coenen, et al., 2001:536 and Winters, 2003)

Both complete and partial assimilation, especially the regressive sub-type, can lead to surface weakening or elimination of underlying phonemic oppositions or distinctions. (Gaskell, 2003: 447) As will be shown below, the phonetic realization of an /n/, /m/, /t/, or /z/ phoneme may neutralize the opposition between that phoneme and another phoneme. Furthermore, Son (2008) research for the PhD degree at Yale University involved the study of gestural (or articulatory) overlap and gestural reduction in Korean. In an experiment, using midsagittal articulometry techniques on the study of assimilation in Korean, Son concluded that in the behavior of clusters, labials and coronals were the target of assimilation more often than dorsals; that is, the change in (or reduction of) articulatory gestures occurred more frequently in labials and coronals than in dorsals. (P. 233)

For a consonant to assimilate to another one or to coalesce with it, the process would have to involve one or more of the feature values of one, the other, or both. As it is the norm to classify consonants on the dimensions of place, manner, voice (or energy, Collins and Mees, 2008: 116), and nasality (The ingressive air stream mechanism is irrelevant in the case under study.), assimilation has been categorized into the same dimensions, viz.: place, manner, voice, and nasality. Research has demonstrated that consonants vary in the level of susceptibility to assimilation. Alveolar consonants (in terms of place of articulation) and coronal consonants (in terms of the active articulator involved in consonant production) assimilate more frequently than other consonant categories. Some specialists consider de-alveolarization of alveolar consonants the most prominent kind of assimilation, and claim that coalescence (reciprocal influence of consonants) comes in the second rank (Small, 1999). Winters’ 2003 PhD dissertation concludes that nasals are more prone than stops to assimilate. Consequently, nasals exhibit weaker cues for precise perception/recognition of their place of articulation.

Place assimilation from alveolar to labial is illustrated by the change of the place of production of a consonant on the basis of the following consonant (in English as an example of languages of regressive assimilation). This is illustrated in the pronunciation of ‘foot path’ as ‘foop path’, in which only one feature of the /t/ changes while the others (manner, voice, and nasality) do not; we find the same principle at work in pronouncing ‘can be’ as ‘cam be’; the same applies to ‘pen pal’ becoming ‘pem pal’, the bilabial /m/ nasal at the an acting fricative consonant on an /n/, or other alveolar stops, would incorporate the fricative feature in the stop consonant as in ‘insult’, ‘in summer’, and ‘that city’. The stop sound /n/ at the end of the syllable or word acquires the fricative feature from the next sound. In short (the phrase in short itself contains this sequence), this can be represented in the equation: "stop + fricative" can cause the loss of the stop feature of the first member of this cluster. In conditions where the sequence of consonants includes an alveolar stop followed by a palatal (or post-alveolar), the process of palatalization occurs involving both place and manner assimilation as in ‘ensure’ in short ‘tease you’, ‘did you’, and ‘censure’. Some call the incidence of the sound /y/ as the cause of palatalization ‘yod coalescence’. In other words, both the /y/ yod) and the consonant undergo place adjustment to each other, thus the assimilation process yields the difference between the two pronunciations of words like individual, opportunity, and phrases like miss you, last year, as you, did you, and let you.

The third subtype of assimilation is that of voice. In English, this underlies the devoicing of the regular plural morpheme /z/ in words that end in a voiceless plosive stop, e.g. cats, books, and stops (cf. dogs, boys) and the morpheme expressing the third person singular as in eats, speaks, and the possessive marker in phonetic environments of the same type, e.g., Pat’s book, Jeff’s idea, and the devoicing (or late VOT – voice onset time) of liquids after voiceless plosives in English, e.g., play, tray, and clay illustrate the work of this principle. Furthermore, intervocalic /t/ in some English varieties, as in writing, and betting, acquires the voicing feature on the same principle. The /t/ and the /d/ phonemic opposition is neutralized in such and similar occurrences of the /t/ phoneme.
The nasality of nasal phonemes may extend to neighboring (non-nasal sounds. For instance, vowels preceding nasal in English words, such as ten, blame, and sing, may be nasaled in anticipation of the following nasal.

5. The Interface between Tajweed and Phonetic Rules on Consonantal Assimilation

Having looked at major aspects of consonant cluster assimilation in current phonetics knowledge, we can now identify the points on which the tajweed rules are in consonance with what occurs in languages and the points which seem to contravene or show a phonetically unnatural process. The term natural refers here to what can be motivated or explained by reference to muscle or gesture mechanics. If a gestural rationale can be identified on the basis of its occurrence in languages, the phonetic conditions for assimilation obtain. However, having the 'right' conditions does not entail that the process is activated in one or more of the languages of the world, including Arabic. Below, an interface of the tajweed rules and current scholarship on the topic is drawn.

On the first point, the direction of assimilation, the tradition indicates that assimilation in tajweed rules is anticipatory. This is a confirmation of the generalization in current phonetics that some languages are more anticipatory than perseverative.

On the second point, the assimilation of /n/ to following consonants, current phonetic knowledge upholds the tradition only on the fricatives. In this group, the /n/ sound acquires the fricative feature from the following fricative consonant. The rules of tajweed on the glides /w/ and /y/ are also confirmed by current knowledge in phonetics.

However, on the plosives, the tradition does contravene the principles of current phonetics in a very striking deviation or anomaly. It is clear, however, that the sound following the /n/ sound in the first instance is /t/, which is a fricative; in the second instance, on the other hand, the sound following the /n/ sound is a stop. Naturally, their effects on the preceding /n/ must be different. The /n/ sound is a (nasal) stop, in the sense that in producing it the air stream is totally blocked in the oral cavity. The airstream is not held or trapped in the oral cavity; rather, it is released through the nasal cavity and this is why it is a continuant, but certainly not a fricative. The Arabic /t/ and /d/ phonemes are stops and plosives (in the sense that the air stream is held (or trapped) in the oral cavity (with the passage to the nasal cavity completely closed)) until the articulators separate and make the plosive feature. Therefore, when the /n/ precedes these consonants in a cluster formation, the assimilation should be only in place but not in manner because the latter possibility has NO phonetic conditions to support it. The rule of /n/ is completely phonetically irrational because it generates an /n/ sound that is an approximant in an assimilation process to a stop. In short, the tradition confuses fricatives and stops although both categories are described properly and correctly categorized to an acceptable degree, considering knowledge in former times.

Thirdly, the assimilation of /n/ to an upcoming /b/ changes the place of articulation for the phoneme /n/, from dental or alveolar (depending on which description one subscribes to) to bilabial but does not change the nasality of the (new) sound. In the tajweed tradition, the /m/ sound, whether it is the underlying or the surface form seems to be constricted in a very 'unnatural' way. The description of this /m/ sound makes it either a bilabial nasal fricative followed by a bilabial stop, or a bilabial nasal affricate in the sense that the lips are closed at the beginning of its production, then they slightly separated, than they are brought back together for the production of a voiced bilabial oral /b/ sound. This is what the tradition calls إِخْفَافٌ شَفَوِيٌّ. As is obvious, there is no justification for introducing the fricative feature within an all-stop environment.

As for the fourth point of consensus in the tajweed tradition, the rule concerning /n/ does not apply to certain specific words. This exclusion from the rule domain is not groundless in current knowledge. There are phonetic rules that do not across the board, but they are lexicalized, i.e., restricted in application to certain items. Here, again the tradition rule is not anomalous.

Again on the /n/ sound assimilation to /w/ in two instances, نَ وَ الْفَتْنَةُ، يَسْ وَ الْقُرآنُ, it is hard to find a principle in current phonetics to evaluate the position of the tradition; nor can we find support for the rule in the tradition. However, we may venture an idea. The ambiguity of the judgment derives from the absence in the literature of the basis for writing the sounds in letter form not letter name; for example, writing /l/ could be simply l or el, or jee (for g), and so forth.

On the sixth point, the assimilation here is one related none of the dimensions of place, manner, voice, or nasality. The issue concerns the feature of velarization, which is phonemic in Arabic, unlike the velarization of /l/ in English, which is only phonetic. There are two sets of consonants in Arabic by this criterion: the plain and the velarized consonants. There are two sets of consonants in Arabic by this criterion: the plain and the velarized consonants.

The seventh and eighth points relate to the class of words called 'particles', not nouns or verbs. (Arab grammarians still think in terms of three parts of speech: nouns, verbs, and particles.) There is no phonetic justification for restricting the assimilation of the /d/ to other sounds or the /l/ to other sounds. Normal speech in
current Arabic exhibits such instances of assimilation. However, the principle still stands that the activation of phonetically motivated assimilation is a subjective, optional choice.

On point 9, the founders of the traditions seem to have included grammatical functions in phonetic realizations of sounds. We do not find support for this in current phonetics; nor can we find a refutation for their position. To what extent can grammar provide a base for phonetic realization of phonemes can be a valid issue for future investigation.

Finally, the issue of the /m/ assimilating in place to a following /f/ sound seems to contradict the rationale of assimilation. While assimilation is considered to be based on natural speech which reduces the recognition features of the sounds, other rules are justified on the basis of avoiding phoneme overlap. Pronouncing /mayyashkor/ as /mayyashkor/ produces a name of a female in the first word, which dies not fit in the context. On the other hand, assimilating the /m/ to the /f/ would not bring in as much semantic violation in the phrase.

6. Conclusion
This study has attempted to question the phonetic validity certain rules of Quranic tajweed within the general field of the sciences of the Quran reading in the tajweed style. The presentation was made from the perspective of socio-phonetics. Giving special attention to the holy word is a universal element of faith in world religions and has historically been the prime motive for many pioneering language studies. The survey of tajweed practice has shown that the same reader may not be consistent in his style. The variations, however, whether in reading style or vocalization, do not undermine the sanctity of Quran, its meaning, or its form.

The study aimed at finding elements in tajweed rules of vocalization that were based on principles in phonetics that still hold validity. It also aimed at identifying rules that do not meet criteria of phonetic principles, especially as regards consonant regressive assimilation. Most people who are exposed to the tajweed practice are now familiar with only one reading: Hafs from Naafi’. Despite its international standing, it is not any different from the less known styles in that they all have some phonetically unmotivated ways of vocalization. It is our humble suggestion that the unmotivated vocalizations be brought to what is phonetically plausible.

Notes
1. One of the major motivating factors for some Quran phonetic studies in the first millennium CE was pedagogic, addressed to those whose proficiency in Arabic pronunciation was a potential source for (what specialists in language learning call global) problems.
2. We are not concerned in this paper with the debates over the recitation styles or readings. For readers who are not proficient in Arabic, Nelson, 2001 is the most detailed and dispassionate study on this issue.
3. For the history of writing on this topic, see p. 12 ff. in (شذبي، 2006). (شذبي، 2006).
4. This is in the sense of having met the agreed criteria of validity set by the majority of scholars. There were however readings which were considered unsupported by means and measures of authenticity. The case of Shannabouth retracted his arguments for and practice of certain readings, maverick readings, so to speak is reported on page 38 in .
5. Centuries later, Ibn al-Jazari first described only three, then seven, and finally ten readings. For the most recent research on the concept of the seven readings, see the following source: (الهدي، 2006).
6. Some criticized him for making the reading specifications (p.13 in (شذبي، 2006)).
7. In the course of time, scholars of readings added some other variant readings, first raising them to ten, then to fourteen, then to forty after the ten. (See (شذبي، 2006).)
8. Many authors dealt with the compound and simple assimilation in Quran recitation. Below is a sample of titles and authors:

Reshāqī al-ʾādām/kullī, Abū ʿAbd Allāh al-Bismī (d. 154)
Kitab al-ʾūdān (Abū Zākariyya) bi-ībād Allāh (d. 207)
Kitab al-ʾūdān Abū Ḥāmid al-Musnāmī (d. 255)
ʾādām An-Naṣābūrī (d. 368)
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________ and Navid Kermani (2006) 'Recitation and aesthetic reception,' in McAuliffe, ed., pp.: 115 - 141
Tajweed.com/shatebeyya.htm. Accessed several times, the latest on Friday October 30, 2009 at 10:45 Jordan local time
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