ChargeS

Position And Location

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# Introduction on Problem Statements

## General Problem Statement

Parsing charges is complex. The charge is described using natural language, with very few grammatical rules, and the ones in place are very lenient and accepting.

The Definition of a charge in the point of view of the grammar is also very vague and contains a lot of different objects that have a lot of different behaviours.

In heraldry, a charge is any emblem or device occupying the field of an escutcheon (shield). This may be a geometric design (sometimes called an ordinary) or a symbolic representation of a person, animal, plant, object or other device.

A charge needs then to be refined and its definition to be split in between all the types of components that it can represent. The final goal is to list exhaustively all the different options that can be applied to a charge and thus used to represent the parsing methodology.

Most of the grammar source comes from here: <https://en.wikisource.org/wiki/A_Complete_Guide_to_Heraldry/Chapter_8>

### Types of Charges

There is multiple type of charges, defined in order to extract their particularities, but in heraldry, all of them would fit the charge description.

#### Simple Charge

The simple charge is just a subset to represent charges that are not in a group, with all the complexity of position associated. Some grammar rules enforce that the charge represented is simple, even sometime simple and unique (no plural) the semy for example. The properties, subpart and other element of the charge are then applied only to this simple construct.

#### Complex Charge

By opposition, the complex charges are group of charges, the complex charge as a construct does not care about the individual charge properties within, but might apply properties, traits and other alteration to the whole group. This also need a specific grammar and definition for the positions of the charges within the group.

### Charge Element

Also named objects, charge element is the actual shape that is representing the charge. There are only 2 main groups

#### Ordinaries

The list of geometrical objects called ordinaries (and sub ordinaries) can be exhaustively listed, and thus is the easy part of the charge element construct. The properties and attributes of those ordinaries also tend to obey to stricter rules than other symbols

#### Symbols

The most complex part of the charge, especially when parsing a text. The symbol names, attributes and description can be infinite and thus are relatively hard to detect, and likely break any correct interpretation by the grammar rules if a little complex

Example: Gules, three legs of a mam armed Proper conjoined in the centre at the upper parts of the thighs, flexed in triangle, garnished and spurred Or

In this example, the field is gules, and the only charge (with its tinctures and subparts) takes the whole rest of the blazon. Ideally this kind of symbol: Three legs of a mam conjoined in the centre at the upper parts of the thighs, flexed in triangle, should be a single symbol, let us name it Sicilian Legs. Then the blazon should be: Gules, Sicilian Legs armed proper, garnished and spurred or.

## The Problem of Attitude and Attitude Attributes

The attitude is an addition to a symbol that helps describe its position or behaviour, this is an adjective or an adverb, and does not have any article in front of it.

Since the list of potential attitudes could be exhaustively listed, if not recognized, this is then, just an extension to the symbol definition. For example, if Lion is a generic symbol. And Rampant is not a recognized attitude, then Lion Rampant, become the actual symbol name.

The exhaustive list of English attitudes can be found from the chapter X onward here: https://www.gutenberg.org/files/41617/41617-h/41617-h.htm#page172

## The problem of Shared Properties

## The problem of Subpart and Subpart Groups

For most symbol, the representation is meant to enable multiple simple tinctures. This is done by defining “sub parts” of the symbol. This is usually done through a verb that implies where the subpart is applied and followed by the simple tincture to apply on it.

### Simple Subpart

As of now for the sake of simplicity only verbs can be considered as a valid subpart identification. The subpart verb in British English should then always finish by “ed”.

### Positioned Subparts

It is possible for a subpart to be described as an addition to the symbol TBD

Subparts VS Symbol Name

Because the name of charge symbol is virtually infinite, and the same can be said for the symbol’s subparts, the detection through grammar needs to differentiate, if a construct is meant to represent a charge, or meant to represent a symbol.

Example: ARGENT A LION GULES ARMED OR

In the previous example, how is the system supposed to know that “Armed” is a subpart of Lion, and not another charge? Because the grammar prevents the usage of multiple symbol (non-deterministic charge) one after the other unless matching a full complex charge (like charge list) grammar.

## The problem of Location

The definition of a position compared to a location comes from the notion that a position is relative to another element (usually a charge) whereas a location can be absolute on the field or another charge.

## The problem of position

When there is more than one item in a container (usually the field) then the charges need to either be located (in base, in chief) inside of the container, or (sometimes and) be positioned in relation to each other.

The position of the charges need not be specified when they would naturally fall into a certain position regarding the ordinaries. Thus, a chevron between three figures of necessity has two in chief and one in base. A bend between two figures of necessity has one above and one below. A fess has two above and one below. A cross between four has one in each angle. In none of these cases is it necessary to state the position. If, however, those positions or numbers do not come within the category mentioned, care must be taken to specify what the coat exactly is.

### Position Keywords

There are a lot of keywords used to place charges on the field or in relation to each other, a lot of different locations can be used to “compose” charges, usually those terms are dependent on the animal or object type used as the main charge.

In this problem statement we only focus on generic keywords that are not dependent on the object.

#### Composition keyword list

As stated above, even if the composition keywords are not part of the problem statement, some examples are showed here for complete understanding

* On: an earn (or hawk) perching on a salmon. An animal is “on” another one, this is the composition of a “one” charge rather than a generic position of a charge being “on” another, meaning the charge is not rendered within the parent, but literally “on” it. Like above it.
* Issuant: a lion rampant between three crescents an estoile issuant from each gules. Here the term issuant, also position the charge in relation to another one. It is a more generic position but can only applied to 2 charges and is never complex. It is not part of this scope but need to be handled at some point.
* Surmounted with: Gules, a castle surmounted with a tower argent; in base a lion passant gardant or. Here the term “surmounted” means that the tower is on top of the castle, not a real position but a description that help compose the charge itself. It can be the description of a charge on its own. Not a key word.

#### Position Keyword List

All the keywords we are interested in are listed here, there are more of them in use of course, but they are considered “composition” keywords and not position ones.

* And (or coma ‘,’ or nothing)
* Between: A term applied to the principal charge occupying a central position
* On: Placed upon
* Within: When an ordinary, or charge is surrounded by anything, it is said to be within
* Surmounted: Terms to express any charge having another placed over it. It is also expressed by the term Debruised.
* Overall: Surmounted but when there is more than one charge that is surmounted
* Charged: A term applied to either the shield, or any bearing whatever when any device is placed on it

## The problem of Refactoring

# Grammar design and hierarchy

So, by definition, after the field was found, the next items in the blazon are charges.

This is a plural because even if there is only one charge, it still belongs to the “charges” umbrella parent.

Charges can contain multiple charges; it must contain at least one charge. Which is deemed the “main” charge. Then if more than one charge, the remaining need to have a defined relationship (position wise).

In this section, will be presented all the examples of charges that are representing the problems stated in the previous section. For each header, the problems that are represented are stated

## Simple Main Charge

In the simplest case, the main charge is alone in the “charges”.

### Happy path

Example: Or, three hamades gules.

The details about tinctures and article are not part of the scope of the “group” definition.

# Attitude

## Plural Simple Charge Attitude – Explicit Position

Simple plural charges, that are only composed of the same element, and not using any complex grammar, can be explicitly positioned using an attitude attribute (here addorsed).

Example: Azure, seme-de-lys or, two croziers addorsed argent.

# Subpart

## Simple Subpart

Example: AZURE A LION RAMPANT BARRY OF TEN ARGENT AND GULES, ARMED OR

## Multiple Subparts In a group

Example : Argent three lions sable armed, langued and crowned or

When multiple subparts are all sharing the same simple tincture the subpart group is the one owning the tincture, and each subpart name is just a part of the group

## Multiple subparts not in group

Example : Argent, a lion rampant purpure crowned Or, langued and armed gules

When multiple subparts have their own simple tincture, they belong to a list. A list can include a group as well. The difference being the existence of the non optional tincture of the subpart.

# Location

# Position

## Simple Implied Position Charges

When multiple charges are involved, the position of the secondary charges can be implied, either from the main charge (or the preceding or host charge)

### And

Example: Argent, an oak tree Vert and a chief Sable.

Here the first charge, is the main one, and is defaulted as a position within the parent field. The secondary one is described after it and because it is a chief, automatically position itself on the top of the field.

### Between

Example: Or, a cross between four keys gules.

In this example, because the main charge is a cross, then the other charges does not need to explicitly describe their position because they are 4 and thus fall into the implied “one in each section” rule. Which means every key will be in one of the corner of the cross (top left, top right, bottom left, bottom right).

Or the definition of the charge itself imply its location (absolute or relative)

The keyword can also be present before both charges are stated.

Example: Argent, between two chevrons sable three ashen keys vert

### On

Example: Argent, on a chief Gules three pallets Or.

As for all simple example the position is implied because the 3 pallets would follow the parent “chief” orientation to render themselves, so there is no need to specify their location.

On can also be found to not start the grammar, in this situation it behaves like “charged” and all example found where using the “each” keyword

Example: Gules, five fusils in fess argent on each an escallop sable

### Within

Example: Argent, two chevrons within a bordure engrailed Gules

Within is only applied to borders, so everything “within” is always implied to be centered, or rather displayed the same way than if there were no bordure (with the reduced space obviously).

### Surmounted

Example: Argent, three piles Sable surmounted by a fess wavy Gule.

Surmounted implies that the charge surmounting the other, does not care about the charge on which it is, and can move beyond its bordure, in this sense it is different from “on” or “charged”. Which both implies a “container/contained” relationship. Thus, the fess wavy gules would display the same way as if it was directly on the field, it just happen to be on top of another charge.

### Overall

Example: Quarterly Or and Gules and overall a bend Sable.

Overall is the same as surmounted but it has a specific case that it is used when there are multiple charges that are being surmounted OR (this is the real exception) is used to say that the charge is over all the division. In this case the field is the part that is being “overred”.

### Charged

Example: Or, three bars wavy Gules each charged with an escallop Or

Charged is the same concept as “on” but is used when there are multiple charges that are all charged, and not all being surmounted by one charge. Or when the term “on” would not be applicable (outside of the field or in some complex syntax)

## Simple Explicit Position Charges

When multiple charges that have no implied position are described, then their location need to be explicitly stated.

### And

Example: Azure, two eagles displayed in chief and a mullet in base argent.

Here both charges are mobile charges (animals) and thus at least one need a location provided, in this example both define their location, as usual the first one is the one that is the main charge.

Example: Gules, a castle surmounted with a tower argent; in base a lion passant gardant or

Here, the main charge which is a castle surmounted with a tower is not located, so it uses the default central location, because its parent is the field. The secondary charge though, being another mobile charge, needs to define its location, here, it is not relative to the main charge, but absolute, in base.

### Between

Example: Argent, a saltire between three mullets in chief and flanks all Sable and a boar’s head erased Gules in base

Here the main charge is the saltire, and then there is the between key word, the between keyword means that all following charges will be surrounding the main charge. Because the charge is a saltire, we expect the description of 4 charges (might be groups surrounding, example in the complex examples). If the charges were the same, then there would be no need to define the locations. But since all the charges are not the same, the location is defined for the 3 on top and the sides (the mullets) and the one in the bottom (the boar’s head).

Example: Argent, a chevron between two cinquefoils in chief Gules and a saltire couped Azure in base

In this situation the main charge is a chevron, thus “between” can only refer to 2 charges (top and bottom). There are multiple versions of each, but only 2 positions (in chief and in base)

### On

There seems to be no example of “on” position that requires an explicit position. Since the parent will provide the default orientation, the charges seem to always be numbered without details. If an exception is encountered, it can be updated here.

### Within

Example: Azure, (3, 3, 2, 1) nine stars Argent within a bordure wavy Or

In the case of “within” the charges that are inside, are the same, in description and properties as if there were no bordure / within key words. Thus, the position is applied the same as for the happy path.

Example: Party per fesse or and sable, in chief a greyhound courant in base an owl within a bordure engrailed all counter-changed

In this example the position is given for both charges (making it hard to find out which one is the main one). But the position would be the same if there were no bordure.

### Surmounted

Exactly like within in term of explicit positions logic

Example: Azure, three stars Argent and in the centre a cross Argent surmounted by a saltire Gules and in dexter chief a crescent surmounted by a mullet for difference

So surmounting items inherit the position of the charge they surmount even though they are not enclosed in it. You can have multiple surmounted items within the same field.

### Overall

Overall is not concerned with the position since it will be over the whole parent shield, in this case, the objects on which it is over, also are not impacted and define their position the same way as if no overall objects were declared

### Charged

Could only find one example of charged with a specific explicit position for the objects charging.

Example: Argent, a saltire and chief Gules, the last charged with a mullet Or in dexter chief all within a bordure indented Gules

This would be relatively hard to parse with basic grammatical rules.

## Complex Charges Positions

Those are cases when the positioning is a chain of keywords applied on each other’s. Not all keyword can grammatically own other key words, but most options are presented here

### Multiple And

A list is just a chain of charges, so a list cannot contain another list directly, it would just be one list with a lot of elements into it.

### Multiple Between

Example: Gules; a chevron ermine, between two couple closes or, between three escallops ermine

Here we can see that “between” can be applied to another group of charges, in theory (alas not in practice) infinitely. There is no reason to think there can only be one between in any group. We just need to properly clarify the scope of a group.

### Multiple On

It is not possible to have on followed by itself, as it would need to be read, “on on”. Which is not valid a grammar in English. The regular on is followed by the item being charged and the charges.

### Multiple Within

Example: Or, a lion rampant Sable armed and langued Gules within a double tressure flory counter-flory Sable, all within a bordure Gules charged with eight crescents Argent.

### Multiple Surmounted

There seems to not be any example of a charge surmounted by a charge itself surmounted. If there are any exception, then it should be documented here

### Multiple Overall

There can be only one overall on the shield, so no possible repeat of this key word over itself

### Multiple Charged

No example of an item being charged by another item being itself charged has been found, if any such exception is encountered if should be documented here.

## Mixed Charges Positions - And

### And + On

Having a list that contains “On” keyword is possible, there can be one or multiple or all of the items in the list can be “on”.

Example: Vert, a fess chequy Argent and Azure between three cuirasses (or habergeons) Argent and on a chief Argent three buckles Azure

Here the list is composed of a between and a on. It could be 2 on as well (as long as they are on the same level, they can’t include one another).

### And + Between

Same example as the preceding in the section And + On.

### And + Charged

Charged is applied to any container, so it is independent to the construction of the containing list, it is compatible with everything if there is a charged source and an item to charge the source with.

Example: Sable, a naked man Proper and a dexter canton Argent charged with a sword and pistol in saltire Gules

### And + Surmounted

Surmounted is only applied to one charge, so the list is irrelevant, although a list can contain a surmounted charge

Example: Gules, a boar passant Or and a canton Ermine charged with a sword paleways Proper surmounted by a crescent for difference

There seems to be no reason why a list would not allow a surmounted charge within its hosted elements.

### And + Within

There is no such a thing as a list when only a subset of the charges of the list are within something while the rest is not. But in grammar it is possible for a within to include a “and” and thus to follow it. The within would just be the parent of the and node, not the other way around

Example: Argent, a chevron between two cinquefoils in chief Gules and a saltire couped Azure in base all within a bordure Gules.

### And + Overall

Overall does not care about the field definition since it goes over all the definitions of the field. No found example.

## Mixed Charges Positions – Between

### Between + And

When the between positioning use different charges, then the charges surrounding, must be in a list.

Example: Argent, a chevron between two cinquefoils in chief Gules and a saltire couped Azure in base

### Between + On

No between + on example found, in the case where the charges are not the first described, “on” is not used, so surmounted or other word need to be considered.

### Between + Within

Same example than the And + Within.

### Between + Surmounted

Example: Argent, a stag’s head erased and between the attires a cross crosslet fitchy surmounted on the top by a mullet all Gules

The above example will need confirmation

Example: Azure, on a bend invected argent between three crescents each surmounted by a mullet of eight points or, as many chaffinch proper.

### Between + Overall

No example found, but no reason why this would not be possible

### Between + Charged

Pretty rare, but happens, the example above contains complex groups within groups

Example: Or, on a fess between three escutcheons gules each charged with a bend vair two cinquefoils of the first all within a bordure azure bezantée

## Mixed Charges Positions – On

### On + And

Example: Argent, On a chief Gules a Crescent and a Mullet Or

### On + Between

The on keyword declare one charge that is the one being surmounted, and another one that is / are the one on top of the first one. Both of those section can be a group and can support between.

Example: Or, on a saltire Azure between a water-bouget in chief and a lion rampant in base both Sable, nine lozenges Or

Example: Argent, on a bend Azure a crescent between two mullets Argent.

### On + Within

It is impossible to have a “on” keyword which would contain the “within” as the within would then somehow apply to the charge, when it should be a border or other surrounding charge that are not compatible here. There are, however, no reason to not have a “within” containing a “on”.

### On + Surmounted

Usually for difference, any charges that are “on” or otherwise in a group, can be surmounted.

Example: Argent, on a chief Sable three escallops Or with a crescent Or surmounted by a mullet Sable for difference

### On + Overall

Overall is applied to the whole field on which the “on” would be applied, so there is no direct ownership of “overall” from an “on” object.

### On + Charged

Example: Per chevron Gules and Or in chief two Fleeces and in base three Chevronels counterchanged on a Chief of the second a Billet Azure between two Billets Vert each charged with a Horseshoe Gold.

The above example is a “on” node containing indirectly a charged group, but there are examples of charged hosted directly within a “on” group

Example: Or, on a fess engrailed azure between three leopard's faces gules three bezants each charged with a fleur-de-lys of the second on a pile in chief of the second three demi-fleurs-de-lys attached to the top and sides of the first.

For the sake of simplicity, only the minimum blazon will be used here

Example: Or, on a fess engrailed azure between three leopard's faces gules three bezants each charged with a fleur-de-lys of the second

## Mixed Charges Positions – Within

### Within + And

Example: Gules, a banner displayed Argent and thereon a canton Azure charged with a saltire Argent all within a bordure Argent charged with four buckles Azure and as many holly leaves Vert alternately

### Within + Between

Within is applied to border and other surrounding charges that are applied at the field level, so it can’t be between anything. The charges within the bordure though can potentially be “between”

### Within + On

Example: Argent, on a fess Azure three stars Argent within a bordure engrailed Gules

### Within + Surmounted

There is no way a border can be surmounted (like for between) but the charges on it can be as for any other charges.

### Within + Overall

Should be possible but no example found

### Within + Charged

Example: Gules, two chevronels between three mullets pierced or, within a bordure engrailed argent charged with eight roses of the field.

## Mixed Charges Positions – Surmounted

When the object surmounting the charge(s) is an ordinary, the term debruised is sometimes used.

### Surmounted + And

There are no examples of surmounted that contains a list of charges, outside of between definition.

### Surmounted + Between

Example: Gules, two arrows in saltire Argent surmounted by a fess chequy Argent and Gules between three (2,1) buckles all within a bordure indented Or

### Surmounted + On

No finding of surmounted + on, it would seems like the English language have easier time using surmounted + charged, and keep using on to “start” a group not to continue one.

### Surmounted + Within

Example: Or, a fess chequy Azure and Argent surmounted by a bend engrailed Gules all within a double tressure flory counter-flory Gules

### Surmounted + Overall

Overall is not really impacted by surmounted. Like within it does not care about what is its content.  
Example: Argent, a sword in pale Azure hilted and pommelled Or surmounted on the point by a mullet Gules and over all a saltire couped Sable

### Surmounted + Charged

Example: Or, an eagle displayed Sable surmounted by a bend Or charged with three crescents Gules

## Mixed Charges Positions – Overall

### Overall + And

Overall does not seem to be ever followed by a list of charges, since they would need a location, which won’t be compatible that the location is provided by the “overall”

### Overall + Between

No example found of overall + between, maybe for the same reason as overall plus list, the between position would enter in conflict with the overall position, but not sure though.

### Overall + On

Example: Azure, two wings conjoined argent over all on a fess gules three bezants.

### Overall + Within

Overall being on top of the field, it can’t be within. Overall seems to trump within and would be over a bordure description of a within.

### Overall + Surmounted

No example neither, but less obvious reason why this group would not be possible.

### Overall + Charged

Example: Paly of six Argent and Gules and overall a bend Azure charged with three cushions Argent

## Mixed Charges Positions – Charged

### Charged + And

Example: Argent, an orle Gules and in chief three martlets Sable all within a bordure Azure charged with thistles, roses, fleurs-de-lis and harps alternately all Or

### Charged + Between

This is a tricky question. The problem is stated as such. I will start with an honorable: a bend, let’s say its sinister.

So, the main charge is a bend sinister, and we have 2 types of secondary charges, a crescent argent, and 2 stars interchanged. There are infinite ways of organizing those, but let’s focus on the problem at hand. To complete the shield let’s say the bend is azure and the field is paly of 6 or and gules.

1. The bend hosts the crescent, and is surrounded by the stars
   1. Paly of 6 or and gules, and overall a bend sinister azure charged with a crescent all between 2 stars interchanged argent
2. The bend hosts the crescent and the stars, the crescent in the middle surrounded by the stars
   1. Paly of 6 or and gules, and overall a bend sinister azure charged with a crescent argent between 2 stars interchanged
3. The bend is surrounded by the stars each hosting the crescent
   1. Paly of 6 or and gules, overall between 2 stars interchanged each surmounted by a crescent argent, a bend sinister azure.
   2. Paly of 6 or and gules, overall a bend sinister azure between 2 stars interchanged each surmounted by a crescent argent.

I am not sure about the validity of those claims. Would need to ask for confirmation, do not know where to ask though.

Original example: Paly of eight Or and Gules, and overall a bend sinister Azure charged with a crescent Argent between two stars Or

Attempt at describing it from the root example

### Charged + On

No example found of “charged + on” it also makes little to no sense to have that combination so likely non-possible.

### Charged + Within

There is no example of a charge charged with another charge and this charge being “within” any bordure or any other object, all within is found though but then it is not applied to the charge, but the whole preceding group.

### Charged + Overall

There is no impact, as for most other group, overall is applied over the division of the field or all the element on it.

### Charged + Surmounted

Example: Gules, a boar passant Or and a canton Ermine charged with a sword paleways Proper surmounted by a crescent for difference.

## Mixed Charges Positions – Chains

### AND + ON + Between

Example: Parted per pale indented Sable and Argent, two harts’ attires counterchanged and on a chief Gules a crescent Or between two Ermine spots

## Charges Positions - Default

Some of the keywords used to position charges compared to others are providing “default” or “implied” location based on the situation

### Field

When the field is the host of the charges, the number of charges is the way to determine what will be the location of the charges.

The field is always considered to be the portion of the shield that host the charge. So, for example if a chief is present then the “available” field is the whole shield except the chief.

1. One charge is always displayed on the centre of the field,
2. Default display is one on top of the other
3. Default display is in triangle, one on top-centre, 2 below, one left, one right
4. Default display is a square 2 on top left and right, 2 below it with the same vertical alignment
5. Default display is a pentagram, one on top centre 2 below it on the extreme left right and 2 below it on more reasonable left and right alignment
6. Default display is a 1-2-3 so 3 lines with 1, 2 and 3 charges respectively, the top one vertically centred, the second row left and right of it and the third-row centre also vertically centred.

## Charges Positions - Implied

### Between

When the charges are placed around another (another between charges) then the charge being “between” and the number of items that are surrounding it, it implies different position.

In the cases of a cross and of a saltire, the charges when all are alike would simply be described as between four objects, though the term "cantoned by" four objects is sometimes met with. I do not know where the default position for 2 items “around” a cross would be though, cannot find this yet

Example: Argent, a cross engrailed Sable between two mullets Azure

### On

Some honourable imply a direction in this case the default is to align the placed charges to follow the direction of the honourable they happen to be on

## Charges Positions - Explicit

When charges are placed in a series following the direction of any ordinary, they are said to be "in bend," "in chevron," or "in pale,”, and not only must their position on the shield as regards each other be specified, but their individual direction must also be noted.

Example: Argent, two swords in chevron Azure

A coat of arms in which three spears were placed side by side, but each erect, would be blazoned: "Gules, three tilting-spears palewise in fess;". Palewise being applied to the single charge (each tilting-spear) and in fess applying to the series itself

Example: Gules, three tilting-spears palewise in fess;

but if the spears were placed horizontally, one above the other, they would be blazoned: "Three tilting-spears fesswise in pale,". Fesswise being applied to the spears and in pale to the series

because in the latter case each spear is placed fesswise, but the three occupy in relation to each other the position of a pale. Three tilting-spears fesswise which were not in pale would be depicted by default 2 and 1. (why though the default on the field should be 1 and 2, unless specified 2,1).

In the case of a division (cross or saltire) if the objects are not the same, they must be specified as being in the 1st, 2nd, or 3rd quarters, if the ordinary be a cross. If it be a saltire, it will be found that in Scotland the charges are mentioned as being in chief and base, and in the "flanks." In England they would be in pale and in fess if the alternative charges are the same; if not, they would be described as in chief, on the dexter side, on the sinister side, and in base.

Example: Argent, a cross engrailed gules in the first quarter a cinquefoil vert

Example: Per saltire ermine and azure in chief and in base a lion rampant gules and in each flank three cross crosslets fitchy or.

# Refactoring

## Charges Refactoring - Each

### And

And can be followed by each, but each cannot be followed by and. The exact cases when and is followed by each is a refactoring of the list properties:

Example: Parted per chevron Gules and Argent, three wolves’ heads erased counterchanged and each armed and langued Azure

In this example the colour of the charge is different than the colour of the elements of the charges, and there are multiple charges, so each is used to apply the specific tinctures on all the charges. To be honest in that example, omitting the “and each” would yield the same result. The logic is not about assigning the element within the and group but just to share properties on all the elements on the group. It is by this definition outside of the scope of this documentation and will need to be tackled in the property’s management

### Between

No examples of “each between” or “between each”. So, does not seem to be possible to refactor

### On

No example of “each on”. But found examples of “on each”, which is the refactoring of applying the same “on” to all the (usually numerated) charges preceding the key word. This is the only case when “on” is used as non-starting term in the group.

Example: Gules, five fusils in fess argent on each an escallop sable

### Within

Found an example of “each within” where multiple charges (enumeration) are applied the same within, one by one. In this case the “within” keyword is literal and not applied to a bordure or overall container, but just a relationship between 2 charges.

Example: Quarterly, 1st and 4th, (Hardy:) Argent, on a bend invected plain cottised gules between three Catherine wheels or, on a chief of the second as many leopards’ faces of the third; 2nd and 3rd, (Gathorne:) Per pale argent and or, a bend compony azure and gules between two pellets, each within an annulet sable.

No examples of “within each” found so far

### Surmounted

Surmounted can be refactored with each to be applied to all the charges.

Example: Azure, on a bend invected argent between three crescents each surmounted by a mullet of eight points or, as many chaffinch proper.

### Overall

Over all have the “all” keyword in its name, so it is refactored by default, it is always applied to the whole field before it, and thus never to the individual charges that precede it as would “each” suggest, so both are incompatible.

### Charged

Example: Or, three bars wavy Gules each charged with an escallop Or

There is no example of “charged each”. Which would not make a lot of sense syntax wise anyway.

## Charges Refactoring - All

This marks the following group as being applied to all the groups preceding it. Sometime implied, needs to be provided when a doubt arises regarding which group belong with which one. By default, the group (if a position group) is applied to the previous charge (no matter which one). More detail in the grammar proposal.

All is also sometimes followed by the “the whole” + group keyword, to surround / refactor even more the latest refactored group. This is explained in its own section

### And

Lists are not positioned groups, so they are not subject to the “all” keyword because we cannot apply a list to a preceding group. If such an attempt were made it would be “on” followed by the list of charges. A list can be the target of refactoring by being followed by all + group name.

### Between

Between can use the “all” keyword to refactor all the groups that were described before, or just to express it is applied to all the charges in the preceding group (and not just the last one)

Example: Gules, two greyhounds counter-salient Argent collared Gules and in the chief point a stag’s head couped attired with ten tynes Or, all between three fleurs-de-lis also Or

If the “all” keyword was not applied the “between” would be on the last charge.

### On

No evidence yet of “all” preceding on, since the on group is mostly defined in its grammar as defining the groups after the key word there would be few examples where the all will be preceding the on as the charge or group under the other would be described after the keyword.

### Within

Example: Argent, a chevron between two cinquefoils in chief Gules and a saltire couped Azure in base all within a bordure Gules

It is usually implied if the within is followed by a bordure or / and is the last charge of the shield that all the preceding charges or groups are within it. But mostly stated.

It is also possible that the all is applying a single tincture to all the previously stated charges, in the following example, the located charges, and then the bordure in which they are all get applied the same “counterchanged” filling.

Example: Party per fesse or and sable, in chief a greyhound courant in base an owl within a bordure engrailed all counter-changed

This needs its own specific grammar with all the usage of simple charge that DOES NOT list their own tincture but expect it to be listed by the parent group or list in which they belong. Would need to find an example of tincture that is not counter changed, to check if this is possible to use any or only valid grammar for counter changed.

It is possible that the previous example apply the bordure only to the base (the owl) if this is the case (need to validate) then the current representation should be replacing within a bordure with all within a bordure engrailed counterchanged ?

### Surmounted

Does not seems to be any example for all followed by surmounted.

### Overall

Overall, already contains the “all” keyword in its name so it is implied that it is refactored already and applied to all the elements preceding it.

### Charged

All + charged would end up as being overall, if every single charge needs to be charged themselves then the logic would be to use “each” and not all. No example found.

### Other cases

All is also applied to refactor properties like tincture (especially common for counterchanged)

## Charges Refactoring - The Whole

Only used before “within” or “debruised” when a list or a group needs surmounting.

# Grammar Proposal / Solution

## Position Grammar

So here we will list all the cases possible to group charges and position them together (not talking about absolute location, only lists, group and relative positions). Then the list of option will help us refactor the grammar.

* SimpleCharge: The simple charge (as displayed in the examples above) is just the definition of a one charge that is part of a group. It can contain a lot of sub elements; which grammar is not in the scope of this documentation. But for the sake of information it is usually a number, a charge name, charge location, charge tincture and other properties (like orientation).   
  A simple charge can be either single or plural.
* SingleSimpleCharge: A simple charge that is only 1 charge, with no numeral or a stated “one” charge numeral
* PluralSimpleCharge: A simple charge which numeral is stated and superior to 1
* Field: The area on which the first tinctures are applied (by division or not). A quarterly would have one shield per quarter (and thus one field also) unless the quarterly is only about tinctures, in this case, with overall, there is one shield with all charges above the quarters
* PluralSurmounted: a charge surmounted, where the ordinal is stated and superior to 1
* PluralCharged: a charge surmounted, where the ordinal is stated and superior to 1
* DivisionOfTheField: a field that have been divided in multiple area like party, quarters, gironny …
* All: see the corresponding section on refactoring, this represent the keyword used to group all preceding charges and host them in the current.

### And

In its simplest form, and is just a list of simple charges, with a separator

* AndSeparator := And | ,
* And := SimpleCharge (AndSeparator SimpleCharge)\*

A list can be directly including 3 types of “group” that are not simple charges: On, between and charged. So, we need to add those to the grammar.

Remark: The groups can themselves be inclusive of other groups, so unless stated there is no limit in the amount of recursiveness possible (of course in the real world it stays relatively simple).

* And := (SimpleCharge | On | Between | Charged) (AndSeparator (SimpleCharge | On | Between | Charged))\*

If we refactor the options in the parenthesis

* AndPossibleGroup := SimpleCharge | On | Between | Charged
* And := AndPossibleGroup (AndSeparator AndPossibleGroup)\*

### Between

The simplest grammar of the between node is defined as follows:

* BetweenKeyWord := Between | In Between
* Between := SimpleCharge BetweenKeyWord PluralSimpleCharge | BetweenKeyWord SimpleCharge PluralSimpleCharge

Note that the second simple charge in both case must be numbered in a way that it is more than one item. Which is hard to do compared to the other more advanced between node grammars.

More complex cases involve a between node, including another between node. It does not seem like it should be limited to one. It only seems to be possible to recursively add “between” nodes only in the grammar that does start with the previous block, and not the grammar starting with the key word.

* Between := SimpleCharge BetweenKeyWord PluralSimpleCharge (Between Pluralsimplecharge)\* | BetweenKeyWord SimpleCharge PluralSimpleCharge (Between PluralSimpleCharge)\*

A between node can be hosting list, surmounted or charged:

* Between := (SimpleCharge | And | Surmounted | Charged) BetweenKeyWord (PluralSimpleCharge | And | Surmounted | Charged) | BetweenKeyWord (SimpleCharge | And | Surmounted | Charged) (PluralSimpleCharge | And | Surmounted | Charged)

If we refactor the options in parenthesis we can simplify the grammar. But first it is important to note that the second part of the parenthesis can only work if the Surmounted or Charged are plural. Each surmounted, or each charged would be expected.

* BetweenPossibleFirstGroup := (SimpleCharge | And | Surmounted | Charged)
* BetweenPossibleSecondGroup := (PluralSimpleCharge | And | PluralSurmounted | PluralCharged)
* BetweenMiddle := BetweenPossibleFirstGroup (all)\* BetweenKeyWord BetweenPossibleSecondGroup (BetweenKeyWord BetweenPossibleSecondGroup)\*
* BetweenStart := BetweenKeyWord BetweenPossibleFirstGroup BetweenPossibleSecondGroup (BetweenKeyWord BetweenPossibleSecondGroup)\*
* Between := BetweenMiddle | BetweenStart

Between can also be refactored using the “all” keyword, in this case it moves from potentially being the hosted group of what precedes it to the host of what precedes it. This behaviour is not related to the grammar though, but the grammar needs to detect those cases.

### On

The simplest grammar for “on” nodes is:

* OnKeyWord := On
* OnEachKeyword := On each
* On := OnKeyword SimpleCharge SimpleCharge | PluralSimpleCharge OnEachKeyword SimpleCharge

There are no found possibility of having “on” followed by another identical node, but “on” can contains other groups:

* On := OnKeyword (SimpleCharge | Between | Surmounted | Charged) (SimpleCharge | Between | Surmounted | Charged)

There are specific remarks here, that impact the grammar.

1. The between node, if belonging to a “on” group, can’t start with the keyword. So only the most common form is possible here
2. On each, or when on is used for plural (in the middle of the group) only example found where on the field and using simple plural charges. But there is no logical reason why the other type of group would not be allowed following the key word (likely the same behaviour as charged)

After refactoring

* OnPossibleGroup := (SimpleCharge | BetweenCommon | Surmounted | Charged)
* OnStart := OnKeyword OnPossibleGroup OnPossibleGroup
* OnMiddle := (SimpleCharge | DivisionOfTheField) OnEachKeyword OnPossibleGroup
* On := OnStart | OnMiddle

### Within

The simplest grammar for within

* WithinKeyword := Within
* Within := SimpleCharge WithinKeyword SimpleCharge

Within can contains itself, although the only example available are using the “all” or “the whole” refactoring key word and this was only found once (one recursive iteration)

* WholeKeyword := The whole
* Within := SimpleCharge (All)? WithinKeyword SimpleCharge | SimpleCharge WithinKeyword SimpleCharge All WithinKeyword SimpleCharge | SimpleCharge All WithinKeyword SimpleCharge WholeKeyword SimpleCharge

Within can contain groups as well. One remark, between and surmounted can only be applied to the first part of the within (the group inside) and never to the bordure content. Because of the complexity and all the scenario this is already refactored

* WithinPossibleFirstGroup := SimpleCharge | And | Between | Surmounted | Charged
* WithinPossibleSecondGroup := SimpleCharge | And | Charged
* Within := WithinPossibleFirstGroup (All | WholeKeyword)? WithinKeyword WithinPossibleSecondGroup | WithinPossibleFirstGroup WithinKeyword WithinPossibleSecondGroup All WithinKeyword WithinPossibleSecondGroup | WithinPossibleFirstGroup All WithinKeyword WithinPossibleSecondGroup WholeKeyword WithinPossibleSecondGroup

There are cases where “within” that are not group creating, but part of the charge itself: within a double tressure flory with fleurs-de-lis within and adorned with crescents without all Or

### Surmounted

The simplest grammar for surmounted

* SurmountedKeyword := Surmounted (by)? | Debruised (by)?
* EachKeyword := Each
* Surmounted := SingleSimpleCharge SurmountedKeyword SimpleCharge | PluralSimpleCharge EachKeyword SurmountedKeyword SimpleCharge

The groups that can be hosted by the surmounted grammar are charged and between, but only the between middle scenario. And there is no example of a between group that is surmounted, as it seems that the first charge being surmounted must be singular or the follow up must be refactored “each surmounted”.

* SurmountedPossibleFirstSingleGroup := SingleSimpleCharge | SingleCharged
* SurmountedPossibleFirstPluralGroup := PluralSimpleCharge | PluralCharged
* SurmountedPossibleSecondGroup := SimpleCharge | BetweenMiddle | Charged
* SurmountedSingle := SurmountedPossibleFirstSingleGroup SumountedKeyword SurmountedPossibleSecondGroup
* SurmountedPlural := SurmountedPossibleFirstPluralGroup EachKeyword SumountedKeyword SurmountedPossibleSecondGroup
* Surmounted := SurmountedSingle | SurmountedPlural

### Overall

Overall is special as it does not care about the target, the object being presented as being overall however have its own rules. The simplest grammar is

* OverallKeyword := Overall | Over all | Over-all
* Overall := (DivisionOfTheField | SimpleCharge) OverallKeyword SimpleCharge

All the options before the keyword are on the table, all groups are potentially present.

* OverallPossibleFirstGroup := SimpleCharge | On | And | Charged | Surmounted | Between | Within | DivisionOfTheField
* OverallPossibleSecondGroup := SimpleCharge | On | Charged
* Overall := OverallPossibleFirstGroup OverallKeyword OverallPossibleSecondGroup

### Charged

Simplest grammar for charged

* ChargedKeyword := charged (with)?
* Charged := SimpleCharge ChargedKeyword SimpleCharge

Charged groups possible are only related to a simple charge, but the groups that can be charged are as follow

* ChargedPossibleGroup := SimpleCharge | And | BetweenMiddle | Surmounted
* Charged := SimpleCharge ChargedKeyword ChargedPossibleGroup

### Loop Identifications

The groups, can contain other groups, and some groups can contain themselves. So, it is possible to chain the grammar in such a way that would be “infinite”. This is not really an issue if the input is valid, the input will never be infinite.

But the bigger risk is multi iteration that should not exist and end up being valid because of subgroup override. For example, is a charged group can host a “surmounted” node, but can’t host a “charged” node, then can the surmounted host a “charged” if being itself hosted by a “charged”?

Within and Overall are all starter, meanings that they can’t be hosted by any of the other groups but can host other groups (all of them for overall). Simple Charge is an ender, and never host another group. Both starter and ender can’t create loops and are thus ignored.

Surmounted

And

Between

On

Charged

Every group can host: between, charged and surmounted.

On is only hosted in a list (and) or by itself

And is only hosted in charged and surmounted

So, for example, “on” can only be directly hosted by a list, but a list can be hosted by a charged. Can a charged hosting a list also indirectly contains a “on” node ? I do not think such an example exist, but there is no reason to prevent it in the grammar in theory

## Refactoring Grammar

### All

All is used in front of some of the grouping terms presented in this documentation to apply the following term to all the groups present before it.

By default, the group (or charge) before the new group term is the one that gets applied the next group (see the example in Charged + Between. But when the term “all” is present then all preceding groups will be refactored as the first input of the term placed after the all key word.

Example: Or, a bend sinister Azure charged with a crescent Argent between two stars of the first

If we want to use the term “all” then the tree would change (I changed the last tincture to avoid metal on metal, especially twice the same)

Example: Or, a bend sinister Azure charged with a crescent Argent all between two stars of the second

As shown above, the “all” keyword change which group host which group. Without it, the order of appearance in the blazon is respected, with it, the term after the “all” keyword (here between) will become the host of everything before it.

Group terms that can follow “all”:

* Over all is by default a “all” keyword and always host everything stated before it appears
* Between
* On, can’t be following “all” but can follow over all, which is the same refactoring logic (the parent will be overall though, not the “on” node)
* Within can be preceded by all. It is an exception though, as it must be preceded by all if there is a group before the within, as a bordure can’t surround a part of the charges, it must surround all of them. So “all” is implied even when not stated in the case when only one charge is preceding the within keyword.

From there, a “all” grammar is relatively complex to insert. It can be done at the group level, but also need to be done to share properties (like tinctures) across preceding groups / charges.

Between and Between can also be refactored using the “all” keyword, in this case it moves from potentially being the hosted group of what precedes it to the host of what precedes it. This behaviour is not related to the grammar though, but the grammar needs to detect those cases.

On grammars have been updated with the “all” cases.

All can be used more than once in the same shield blazon (usually, first for a tincture or properties, then all within) the preferred grammar is still to use “the whole” after the usage of all.

The current grammar won’t be able to detect the groups because the refactoring needs to see the whole structure of the tree, and the grammar would just accept a keyword in the current group it parses.

### Each

Same as all, but this time, the follow up is applied to every single item in the previous group (so it becomes a part of the group). Because of the tree build logic, this means a “on” node can be divided into simple “on” and composed “on each”.

The difference with and without the keyword looks like this:

Example: Gules, five fusils in fess argent on each an escallop sable

Meaning that there are as many items in both branches of the each and they are all one to one related.

Example: Gules, five fusils in fess argent on an escallop sable

Meaning that the item after the “on” keyword is as defined by its count (cardinal) but all of the items before the keyword are placed on the other item in the branch.

Same approach for other keywords like surmounted and charged that become composed nodes

Or, three pallets Gules surmounted by a chevron Azure charged with as many buckles Or.

Or, three pallets Gules each surmounted by a chevron Or charged with as many buckles Gules.

I had to change the tinctures to respect the colour over colour rule, but over even if the blazon does not make a lot of sense, it is a valid grammar.

### The Whole

Same as “all”, the difference being that it can only be used once and precede the finishing node of the shield (final parent node of the tree).

The grammar and the node are the same as the “all” scenario.

## Location Grammar

## Format Models