SYMmetry in Court and Country Dance

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Abstract—Court and Country (Contra-) Dances constitute highly formalized and organized patterns in time and space. Although the floor patterns of these dances at any given time can be analyzed in terms of reflection and rotation symmetries, their transformations as the dances proceed are not so easily classified, as the dancers must disturb mirror symmetry in order not to pass through each other. Certain rhythms are analyzed, and a reason for medieval preference for triple time rather than quadruple time is advanced. The distinction between configurations of even and of odd numbers of dancers or couples is demonstrated, as is the symbolic value of the symmetry of some renaissance court dances. The structural differences between traditional English and Scottish Country Dances are presented in the light of historical relations between the two countries.

Introduction

Motion is one of the most basic characteristics of life. We admire the graceful motion of a gazelle, a galloping horse, even of a snake. The harmonious interaction of all parts of the body is necessary to provide effective locomotion. This harmonious interaction in turn leads to what we call rhythm: a periodic repetition of the same contractions and extensions of muscles and limbs. If it is true that play and games are the way in which we learn and hone our skills needed for survival, then the Dance certainly provides us with basic training in the harmonious use of our body. It is therefore not surprising that Dance is common to all civilizations, and that it changes style as civilizations change and succeed each other.

Most work on symmetry is done on static patterns; in view of the importance of dance as an orderly and periodically repeating phenomenon it would seem to be in order for this volume to include a representation of dance as a symmetrical pattern in both space and time. There is, to begin with, the phenomenon of rhythm; at the next level there is the repetition of the thematic pattern of the music, which conforms with the structure of the dance. Then there is the configuration of the dancers on the floor, which is not just a static two-dimensional pattern, but also needs a dimension to indicate the direction in which each dancer is moving.

It is impossible to do justice to these fundamental parameters in a single article; this author does not feel qualified to cover every one of them adequately in depth anyway. Yet, just as the study of magnetic phenomena opened the field of geometric symmetry again by the introduction of Color Symmetry, so the consideration of structures periodic in both space and time may lead to new aspects in symmetry theory. For this reason we present here some of the principal aspects of symmetry in Court and Country Dance.

Rhythm

For simplicity's sake let us consider a very basic musical pattern, although by no means a simple one, namely a drumbeat. To understand rhythm we must assume that the beat will be sounded at least three different levels of intensity, which we shall call piano, mezzo and forte. Let us begin by hearing a sequence of drumbeats sounded at a constant level, say forte, at constant time intervals. These drumbeats provide the pulse and the tempo of the musical pattern established by the drum. Short time intervals produce a fast tempo, longer ones a slower tempo.

Now let the drummer play a softer beat, say at mezzo level, between each pair of forte beats. Although the time-interval between successive beats is now shortened, we would not say that the music has speeded up: the tempo is still determined by the time lapse between the forte beats, which still provide the pulse of the music. The mezzo-level beats could be spaced exactly half-way between the forte beats, or off-center:

f.m.f.m.f.m.f.m.f.m.f.m.
or

\[ f.mf.mf.mf.mf.mf.mf.m \ldots \]

or

\[ f..mf..mf..mf..mf..mf \ldots \]

or

\[ fm..fm..fm..fm..fm..f \ldots \]

Here the dots indicate absence of a beat; a piano beat could equally well have been placed here. The important principle is that we have here a periodically repeating pattern of sounds emitted at three different intensities, \( f, m, \) and \( p \) or \( .. \). Many other sequences could be devised; the sequence of beats characteristic of a sound pattern is called its \textit{rhythm}.

Each of the four examples given has translational symmetry. The repeat unit, or unit cell, is called a \textit{measure}. Since the seventeenth century it has become customary to place a vertical bar in front of the leading forte beat of each measure. Modern editions of earlier music have frequently forced the notation into this bar-line straightjacket, a procedure which obscures the rhythmical flexibility and complexity of this earlier music. The bar-line notation is a historical symptom of the fact that music and dance had become rhythmically more regular and less complex, as exemplified by the driving regular pulse of the Italian baroque concerti of Vivaldi, Bach and contemporaries.

Of the four examples of rhythm, only the first has mirror symmetry. It is represented by the \textit{March}, a walking or professional dance, in which one leg, either left or right, always falls on a strong beat. Not all Marches, however, have so symmetrical a rhythmical pattern. Some Marches follow the second rhythm example, usually by means of a hesitation on the forte beat, the other leg moving through rapidly on the weaker beat.

The sixteenth-century \textit{Pavane} is an example of a march-like processional dance, usually danced by all at the beginning of a formal ball. The \textit{Polonaise} is thought to be a variant having the rhythm of the second example; it is reputed to have been first danced at the inauguration of Henri de Valois, later to be Henri III of France, as King of Poland in 1573.

We have noted that the forte beats ordinarily mark the beginning of a measure. The measure is subdivided into as many subdivisions as are necessary to mark the occurrence of weaker beats. In the first and the last of the four rhythm examples each measure is subdivided into four units: the music is said to be in quadruple time. Similarly, the second and third example is said to be in triple time. It is remarkable that, whereas we tend to think of quadruple time as being the norm, being capable of having mirror symmetry, it was triple time, being intrinsically less symmetrical, which was the \textit{tempus perfectum} of the Middle Ages. Whereas the quadruple-time Pavane was the most common processional dance in the Renaissance, the common Medieval processional dance was the \textit{Basse Dance} in triple time.

The predilection for triple time in the Middle Ages may be understood in the light of the flexibility and flowing nature of the music, dance and costume this period, in contrast with the rather rigid forms which characterize the Renaissance. Two measures in triple time may be combined, the second receiving a subsidiary first beat, so that the following sextuple pattern in three dynamic levels results:

\[ fppmpfpmpfpmpfpmpfppm \ldots \]

Without a change in measure length, this pattern may be transformed into

\[ fpmpfpmpfpmpfpmp \ldots \]

In modern notation the former example corresponds to 6/8 time, the latter to 3/4 time; in either case the measure is now subdivided into six units, but modern notation tends to use the so-
called quarter note as the norm wherever such is possible, as in the second example. These two patterns were often used in combination; the substitution of one in a structure constituted mainly of the other is called a Hemiola. An example of a Hemiola would be the following pattern:

\[ fppmmpfppmmpfppmmf \ldots \]

Although the Hemiola was characteristic of the Middle Ages, it has not disappeared from music and dance. A dance mentioned by Shakespeare is the Sinkapace, a name derived from the French cinque pas, a different name for the Galliard. The basic rhythm of the Galliard is:

\[ fppmmp \ldots \]

but the five steps are distributed over the measure as follows:

\[ fppmmp \ldots \\
1234.5 \]

On the fourth beat the dancer leaps up high, and does not return to earth till the sixth beat, thus causing a stress in the middle of the measure, a syncopation whose name is suspiciously homophonous with the work sinkapace! The Galliard is a showdance, usually danced by one couple at the time. A particular form of the Galliard is La Volta, in which the gentleman lifts his partner up high on the fourth beat, supporting her on his knee. In most galliards the hemiola is used by the dancer to perform three leaps on alternate feet:

\[ fppmmp \ldots \\
1.2.3. \]

In the nineteenth century many composers, notably Brahms and Dvorak, made frequent use of the Hemiola.

Triple time thus lends itself to subdivision into two subgroups of three as well as into three subgroups of two. It is similar to the planar symmetry groups having twofold, threefold and sixfold symmetry, which accommodate motifs having twofold symmetry in three distinct orientations as well as threefold-symmetrical motifs in two distinct orientations. Examples of dances in triple time or in the related sextuple time are, in addition to the basse-danses and galliards already mentioned, the Menuet, Waltz and Jig or Gigue.

FLOOR PLANS

Figure 1 is page 241 of Fabritio Caroso's *Raccolta di varij Balli*, a 1630 reprint of his *Della nobiltà di Dame* of 1600. The beauty of its design as well as the reference to mathematics are notable, and witness to the importance attached to the symmetry of the dance illustrated, in this instance *Contrapasso Nuovo*. This dance is a round dance for exactly three couples. Round dances have always been quite common, as they permit dancers to mix, and because all couples are equivalent, as distinct from processional or line dances, where there is a distinction between leading and last couples. The sixteenth-century Bransles (in England called Brawls) were social mixers for any number of couples arranged around a circle. *Contrapasso Nuovo*, however, is a Ballo, a dance composed of distinct movements in which every dancer traverses a characteristic pattern. In this instance, the three couples each change partners three times, so that at the conclusion of the dance all finish with their original partner. In contrast to the Bransles, therefore, *Contrapasso Nuovo* must be danced by exactly three couples, otherwise the dancers would not finish with their original partner. The symmetry is therefore threefold rotational, as indicated by the illustration.

There is mirror symmetry as well: three mirrors intersect at the center of threefold rotational symmetry. The author[1] has shown that the mirrors intersecting at odd-fold centers of rotational symmetry are polar, that is to say, their context is different in one direction from that in the opposite direction. In this particular instance of *Contrapasso Nuovo*, each mirror line passes
between the two partners of the same couple on one side, between separate couples on the other
(see Fig. 2). In this and following illustrations the symbols “O” and “X” indicate respectively
a lady and a gentleman. Observe that the mirror image of each dancer in every one of the
mirrors is a dancer of the opposite gender. The mirrors are therefore color-active: the pattern
is invariant to reflection accompanied by gender reversal.

The static configuration of Fig. 2 does not give us any information about the direction in
which the dancers are moving. In Fig. 1 we note ribbons woven around each other, which
disturb the mirror symmetry of the pattern, and are symbolic of the way in which the dancers
weave around each other. A simple but very fundamental fact of life is that dancers cannot
move through each other, even for the sake of preserving mirror symmetry. The question whether
a pair of dancers pass each other giving right or left hands, or passing right or left shoulders,
poses major problems to the dance historian, the choreographer as well as the dancer. We propose
to use here the following notation for describing two dancers passing each other, regardless
whether they give hands or simply pass shoulders:

\[ \begin{align*}
\text{O} & \quad \text{O//X or } \text{\langle symbol not shown here}} \\
\text{X} &
\end{align*} \]
Fig. 2. Mirror symmetry in Contrapasso Nuovo.

means dancers pass right shoulders or give right hands, in other words, move to their left diagonally to pass.

\[ \circ \]
\[ \circ \setminus \times \text{ or } \parallel \]
\[ \times \]

means dancers pass left shoulders etc.

Thus one figure in Contrapasso Nuovo, in which the dancers weave around the circle alternately giving each other right and left hands (as in the Grand rights and lefts in modern American folk dancing), would start as follows:

\[ \times \setminus \circ \]
\[ \circ \setminus / \times \]

As the dancers proceed around the circle, each encounters a dancer of opposite gender at sixty degree intervals, at which point the triangular configuration of the three couples is inverted compared to that of the previous encounter, and the symbol for passing shoulders is reversed as well:

\[ \times \setminus \circ \]
\[ \circ \setminus \times \]

The mirrors also reverse their polarity. In summary, then, the Grand right and left motion transforms the configuration such that the entire configuration, including the polarity of the mirrors and the passing symbols, is reversed.

In the Quadrille or Square Dance the symmetry is fourfold rotational; there are four non-polar mirrors of two different kinds[2]. The dancers encounter each other at forty-five degree intervals; the square formation of the dancers now rotates forty-five degrees as well, the mirrors,
being non-polar, do not change polarity, but the passing symbols do. In general, then, we can say that in a round dance for \( n \) couples the grand rights and lefts figure transforms the configuration by a rotation through \( (180/n) \) degrees, accompanied by a reversal of mirror polarity if present, and a reversal of passing symbols. That a symmetry analysis of this dance is indeed relevant to the intentions of its designer, is confirmed by the original manuscript and by Julia Sutton's analysis of the symmetry of Contrapasso Nuovo[3].

**SYMMETRY RELATIONS BETWEEN DANCERS**

In the preceding section we discussed the color-active mirror symmetry between partners. There are many interactions between dancers, and the symmetry of a dance frequently symbolizes these interactions. Beside the interaction between partners, there are flirtations with other dancers' partners, and rivalries between members of the same gender. Particularly charming are the Balli of the fifteenth century, many of which tell a simple story, and which may be considered forerunners of the romantic story ballet.

The first of these to be considered here is La Gelosia (Jealousy) by Domenico da Piacenza (Paris, Bibliothèque Nationale, fds.it.972, ca.1425)[4]. In this dance a number of couples start in processional position, i.e. in couples behind each other. The number of couples in this dance is flexible, but the repeat pattern in the music is determined by the exact number of dancers participating, so that the number of couples may not be said to be arbitrary, as would be the case, say, for most basse danses. Ordinarily the dance is described for three couples.

The pattern of the dance is performed as many times as there are couples, ordinarily three times. According to modern usage we shall call each traversal a Round. Each Round consists of four sections, designated by Brainard respectively A, B, C, D. A is a processional section, in which all couples remain together. Jealousy sets in the second section, when the first man deserts his lady for a brief flirtation with the second lady whose partner dances forward to join first lady. The fickle first man soon deserts second lady for the third lady, whose partner in turn dances forward to join the deserted second lady. As a result the ladies have not moved relative to the original configuration of the dance, but their partners have executed a cyclic permutation \( 1 \rightarrow 2 \rightarrow 3 \rightarrow 1 \), indicating that first lady became partnered by second man, second lady by third man, and third lady by first man. With more than three couples the same cyclic permutation pertains. The third section of La Gelosia again is a procession, this time danced by the couples newly formed in the previous section. Finally, all couples utilize the color mirror which runs down the middle of the set: all change places with partners by the right hand, and back again by the left. Each Round was characterized by the cyclic permutation of the second section, and after dancing a number of Rounds equal to the number of couples in the set, all are reunited with their original partners. Accordingly, La Gelosia is a progressive dance in which the men only progress by a cyclic permutation.

Not all dances of the fifteenth century are couple dances: Vercepe, the next example[5], is danced by five dancers who start behind each other, the men in first, third and fifth position, the ladies in the even-numbered positions. The choregrapher was again Domenico da Piacenza (Paris, BN 972 fol.13–14). In this configuration the third dancer occupies a central position. The symmetry of this dance, which probably denotes a skirmish in the Commedia dell'arte tradition, is twofold rotational around this central figure, the Capitano. The men and the ladies alternately circle around the center, each to music and steps characterizing movements proper to their gender.

A Ballo by Guglielmo Ebreo entitled La Ligiadra (Paris, BN 973 fol.33–34)[6], is a notable example where the symmetry of the dance symbolizes the relationships between the dancers. It is written for two couples who start behind each other; the first section is processional. Following the procession first man and first lady turn halfway around their own axis, with the result that first man now faces second man, while first lady faces second lady (arrows indicate the direction in which the dancers face):

First Couple:  
Second Couple:  
\[ \circ \rightarrow \overset{\bullet}{\leftarrow} \circ \]
\[ \times \rightarrow \overset{\bullet}{\leftarrow} \times \]

Both couples then exercise a number of ceremonial movements and pass through each other, after which a flirtation ensues. First man and second lady approach each other, and dance a
pattern resembling a mirror-image letter "S":

\[
\begin{align*}
\text{First} & \quad \circ \rightarrow \quad x \quad \text{First} \\
\text{Second} & \quad \circ \rightarrow \quad x \quad \text{Second}
\end{align*}
\]

We would expect the first lady and second man to dance the mirror image of this figure on the other diagonal, i.e. a real figure "S." Instead, these two dance the same figures as their respective partners had done, that is to say, also a mirror-image "S." To understand the subtlety of this maneuver, observe that, when the first man and second lady changed places in their flirtation, they arrived in their new positions turning their backs to their rivals. However, when first lady and second man change places describing an inverted "S" on their diagonal, they turn in toward their original partners, whereas, if they had described a real "S," they would have turned their backs on their original partners. In La Ligiadra, Guglielmo therefore resisted mirror symmetry to indicate that the flirtations were only momentary and harmless: the dance finishes with the original partners dancing together again, finally curtseying to their colleagues.

**CONTRA- AND COUNTRY DANCES**

There is little doubt that these two names are related, but there is no agreement as to which of the two is derived from the other. The *Contradance* is a line dance in which the dancers form two rows, partners facing each other across the way. Ordinarily the gentlemen are on one side, the ladies opposite them. However, there are contradances in which men and ladies alternate in each row, still facing partners. The two arrangements are as follows:

\[
\begin{array}{cc}
\text{TOP} & \circ \circ \circ \circ \circ \circ \circ \circ \circ \circ \circ \\
& \times \times \times \times \times \times \times \times \times \times \times \\
\end{array}
\]

and

\[
\begin{array}{cc}
\text{TOP} & \circ \circ \circ \circ \circ \circ \times \times \times \times \times \\
& \times \times \times \times \times \times \circ \circ \circ \circ \circ \\
\end{array}
\]

In either case there is a color-active mirror down the center of the dance. (The top of the dance is the direction toward which the aligned dancers turn in order to have the ladies on the right of their partners.) Perpendicular to this mirror are mirror lines which in the former case are all color-inactive, while in the latter case they are alternately color-active (those passing between adjacent couples), and color-inactive (those passing through the dancers).

It is probable that the English word *Country Dance* is simply a derivation of *Contra-Dance*, for the Country Dances are not necessarily danced only in the country, but they are usually danced in contra-dance formation, in distinction from *Square Dances* or *Quadrilles*, and *Round Dances*. Most of the information which we possess about fashionable dances during the decades following the re-publication of Fabritio Caroso's treatise in 1630 are the various editions of *John Playford's The English Dancing Master*, which were published in the middle and second half of the seventeenth century. English and Scottish Country Dances are historically closely linked, but have developed differently; at present the distinctions are in the style of dancing and the footwork. For our purpose the principal difference between English and Scottish Country Dancing is in the formation of *sets*: whereas the English dances are danced in an arbitrarily long row, the Scottish divide into sets of ordinarily four couples. In the English dances everyone eventually dances with everyone else, whereas the Scots never dance outside their own set.

In either style of country dancing the couples progress, that is to say, they move up or down the line of the dance, partners commonly progressing together. In English Country Dancing the odd-numbered couples (as counted from the top of the dance) proceed down the dance, while the even-numbered ones progress toward the top[7]. This progression is accomplished by the execution of some figure by adjacent couples, which causes these couples to change places. The result is as follows:

\[
\begin{array}{cccccccccccc}
\text{time} & \downarrow & 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & \ldots \\
\text{axis} & 2 & 1 & 4 & 3 & 6 & 5 & 8 & 7 & \ldots
\end{array}
\]
If the same procedure were followed again, couples would simply shuttle back and forth. However, the rule is that each couple, on reaching top or bottom of the dance, must wait out one round before reversing direction. (The even-numbered couples, who are moving up the dance are called *passive*, the odd-numbered ones *active*. On reaching one end of the dance one changes from active to passive or vice-versa.) The result is the following progression: (dancing couples are shown **bold**, the ones waiting a round out are plain)

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</tr>
</thead>
</table>
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ...
| 2 | 1 | 4 | 3 | 6 | 5 | 8 | 7 | 10| ...
| 2 | 4 | 1 | 6 | 3 | 8 | 5 | 10| 7 | ...
| 4 | 2 | 6 | 1 | 8 | 3 | 10|   |   | ...

We note that the odd numbers indeed do move down, the even ones up the dance. The progression is analogous to the progressions in bell ringing called plain bob[8]. The same permutations also occur in dance configurations where all dancers are in single file, usually starting with ladies and gentlemen alternating. In this instance the dancers change places by passing shoulders, and the parameter determining which shoulder should be passed first becomes relevant again. Also important is whether the total number of dancers or couples is even or odd. The following pattern illustrates the sequence for even numbers of couples or dancers in a row:

<p>| | | | | |</p>
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| 1 | 2 | 3 | 4 | 5
| 2 | 1 | 4 | 3 | 6
| 2 | 4 | 1 | 6 | 3
| 4 | 2 | 6 | 1 | 8
| 6 | 4 | 5 | 2 | 3
| 6 | 5 | 4 | 3 | 2

At this point the original configuration has inverted, and from here on the progression continues as follows:

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</table>
| 6 | 5 | 4 | 3 | 2
| 5 | 6 | 3 | 4 | 1
| 5 | 3 | 6 | 1 | 4
| 3 | 5 | 1 | 6 | 2
| 3 | 1 | 5 | 2 | 6
| 1 | 3 | 2 | 5 | 4
| 1 | 2 | 3 | 4 | 5

The symmetry of inversion between the two halves of the dance is evident. Note furthermore that the even-numbered rounds are characterized by the fact that the end dancers remain in place, while in the odd-numbered rounds all dancers progress. Interesting also is that in line dances where the gentlemen start in the odd, the ladies in the even places, two instances occur where the genders are completely segregated.

Now consider the following example having an odd number of couples or dancers in the line:

<p>| | | | | |</p>
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| 1 | 2 | 3 | 4 | 5
| 2 | 1 | 4 | 3 | 5
| 2 | 4 | 1 | 5 | 3
| 4 | 2 | 5 | 1 | 3
| 4 | 5 | 2 | 3 | 1
| 5 | 4 | 3 | 2 | 1
Again we note that the pattern has inverted. It continues as follows:

\[
\begin{align*}
5 & 4 & 3 & 2 & 1 \\
5 & 3 & 4 & 1 & 2 \\
3 & 5 & 1 & 4 & 2 \\
3 & 1 & 5 & 2 & 4 \\
1 & 3 & 2 & 5 & 4 \\
1 & 2 & 3 & 4 & 5
\end{align*}
\]

In contrast to the case of even numbers, there is always one couple or dancer who is immobile, alternately at the top or bottom of the dance.

This progression pattern is so rich in possibilities of mixing and introducing dancers, that it is known by many different names. We noted that in English Country Dances (and New England Contras) it is the standard progression. In renaissance line dances it was known as la haye[9], a name which survives in English dances as the hay, while in Scottish country dances it is known as the reel, a designation not to be confused with one of the three basic rhythms of Scottish dances, which bears the same name. In round dances, where there is no end position, it becomes the Grand Rights and Lefts referred to above, known in Scottish dances as the Grand Chain.

SCOTTISH COUNTRY DANCES

When Marie de Guise married James V of Scotland in 1537, she brought with her the music and dances of the French court. Her daughter Mary was briefly Queen of France, but after the death of her husband the King, she returned to Scotland, and has generally become known as Mary Queen of Scots. After her son, James VI King of Scotland, also became James I King of England, the court at Edinborough lost much of its lustre, but at the same time maintained much of the French court traditions. In the seventeenth century the Country dance developed in Scotland much as in England, but the French influence on Scottish Country Dances is evident in such terms as Allemande, Poussette, and Pas de Basque. After the Roman Catholic descendants of James II were defeated by the Hanoverian Kings of England, at Culloden in 1745, all evidence of Scots national pride was suppressed. Nevertheless, we find on Scottish ball programs of the second half of the eighteenth century alternation of Menuets and Country Dances: this tradition went on continuously from the renaissance court of France till in the nineteenth century a rage of Celtic fashion spread throughout Europe, with Robert Schumann composing songs on German translations of Thomas More and Robert Burns, and Sir Walter Scott being widely read. Queen Victoria and Prince Albert frequently wore the Tartan, and Country Dances were danced in Scottish castles as well as on the village greens. In distinction from the Highland dances, the Country Dances hail primarily from the Scottish Lowlands, the region of Scotland closest to England.

Since in the early twentieth century the tradition threatened once more to disappear, the Royal Scottish Country Dance Society was founded in 1923 to research and record the traditional Country Dances. Some dance historians have doubts about the historical validity of the dances so canonized, but there can be no doubt about the fact that the definition and circumscription by the Society has assured a twentieth-century Scottish Country dance having a recognizable idiom of its own, based on careful folkloric and historical investigation. Scottish Country Dances are being composed and danced on special occasions such as wedding receptions, in all corners of the earth, by Scots, Dutch, Hawaiians and Chinese, but especially by mathematicians.

As stated above, Scottish Country Dances are danced in rows, as are their English cousins, but the lines are subdivided into discrete sets, most commonly comprising four couples, although some dances exist for five-couple sets. Like English Country Dances, some Scottish ones are danced by two couples together; the first couple progresses down the line of the dance as long as there is a couple below them to dance with. Each couple on reaching the end of the set, waits one round until a couple becomes available to dance with. The progression for two-couple
dances in a four-couple set is therefore as follows (first couple leads off with second, while third and fourth couples wait till approached by first couple; cf. Ref. 7):

\[
\begin{array}{cccc}
1 & 2 & 3 & 4 \\
2 & 1 & 3 & 4 \\
2 & 3 & 1 & 4 \\
3 & 2 & 4 & 1 \\
3 & 4 & 2 & 1 \\
4 & 3 & 1 & 2 \\
4 & 1 & 3 & 2 \\
1 & 4 & 2 & 3 \\
1 & 2 & 4 & 3 \\
\end{array}
\]

Notice that, in order to return to the original configuration the third and fourth couples would need to change places with each other; this is rarely done at the end of the dance.

For three-couple dances in a four-couple set the same rules apply: the leading couple dances as long as there are two couples below, then go to the bottom, and all others join as soon as there are enough couples above and below to dance with. The progression is:

\[
\begin{array}{cccc}
1 & 2 & 3 & 4 \\
2 & 1 & 3 & 4 \\
2 & 3 & 4 & 1 \\
3 & 2 & 4 & 1 \\
3 & 4 & 1 & 2 \\
4 & 3 & 1 & 2 \\
4 & 1 & 2 & 3 \\
1 & 4 & 2 & 3 \\
1 & 2 & 3 & 4 \\
\end{array}
\]

Each Scottish Country Dance is danced in one of three rhythms: in fast quadruple time (reel), slow quadruple time (strathspey) or fast triple time (jig). Scottish Country Dances still are essentially ballroom dances, and the footwork, which is beyond the scope of this chapter, is quite stylish. We shall, however, review a few of the symmetrical configurations typical of Scottish Country Dances and symbolic of Scotland or for the events for which they were written.

Particularly common is for the first couple to change places with their partner across the dance from them, then casting down one place, which means passing behind the second couple, while the second couple steps up into first place. First couple then crosses back by the right hand; the resulting configuration is: (the subscripts indicate original first, second, third and fourth couples respectively)

\[
\begin{array}{cccc}
O_2 & O_1 & O_3 & O_4 \\
X_2 & X_1 & X_3 & X_4 \\
\end{array}
\]

There is a name for some of the relationships between the dancers in this configuration. The first couple is now between second and third couples; the dancers directly opposite them are, of course, their partners. The person to the right of the partner is first corner, the one to the left of the partner is second corner. Third lady is first man’s first corner, third man is first lady’s second corner. The diagonals of this rectangular arrangement form a St. Andrew’s cross, named for Scotland’s patron saint. Accordingly, many dances are danced along these diagonals by having first couple face, then dance with first corners, and then repeat with second corners:

\[
\begin{array}{cccc}
O_2 & & O_3 & O_4 \\
X_2 & O_1 & X_3 & X_4 \\
\end{array}
\]
A particularly imaginative use of this St. Andrew’s cross is made in the dance called Mairi’s Wedding. Here the four dancers on the diagonal dance half reels; we saw above that at the halfway point in a reel (hay) the order is reversed. The dancers begin the figure by facing first corners, as diagrammed above. By initiating the half reel passing right shoulders, the first couple describes a loop around the vertices of the rectangle, then meets partners in the middle, and pass partners by the left shoulders to face second corners. Meanwhile the first corners, by dancing the half reel from the end positions, will have changed places with each other. Repeating the maneuver with second corners on the other diagonal, they will cause the original rectangle to become inverted, with each corner finishing diagonally opposite starting position, and first couple once more facing their (original) first corners. All now dance half reels once more on each diagonal, with the result that all finish again in their original position. Whereas this figure in Mairi’s Wedding (there is considerably more to this dance) uses only the vocabulary of the Scottish Country Dance, a very pretty symbolic pattern was created: while their corners shuttle back and forth along the arms of the St. Andrew’s cross, the first couple, in looping around the vertices of the rectangle, describe a four-leaf clover, symbolic of good luck.

CONCLUSIONS

We have demonstrated by examples ranging over a span of five centuries of dance in the Western European tradition, that symmetry constitutes an essential component of these dances, and can serve a symbolic function. Furthermore, as these dances are symmetrical in space as well as in time, there are some aspects to the transformations and the symmetries of these patterns which are not covered by the classical theories of the symmetry of space.

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2. A. L. Loeb, op. cit.
3. Julia Sutton (translator and editor) and F. Marian Walker (musical transcriber) *Nobilitá di Dame by Fabritio Caroso*. Chapter IV. Oxford University Press, to be published.
5. Ingrid Brainard, op. cit. 77–81.
6. Ingrid Brainard, op. cit. 68–70.
7. For the sake of clarifying the symmetry of the dances, we are here letting all couples start together; this is the way in which the dances are usually practiced. In authentic performance, however, the top two couples only begin the dance, and the lower couples join in gradually as the first couple progresses down the dance. When all couples have joined the dance, it proceeds as described herein.